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DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT, TEST AND FVA--ETC (11)
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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 1982 (U)
JANUARY 1981

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 1982 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 1982. Descriptive Summaries for projects within the program elements to be financed during FY 1982 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 1982. A Test and Evaluation Section is provided for all major weapon systems. 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 1980, FY 1981, FY 1982, and FY 1983 data in this Program Element Listing with data shown in the Program Element Listing dated January 1980 will reveal significant differences. Many of the differences are attributable to the following factors:

- a. Restructuring of the FY 1980 and FY 1981 programs for comparability to the FY 1982 program structure.
- b. Reclassification to provide greater visibility and contribute to the effective management of the ROTE program such as the following:
 - (1) ROTE Headquarters Management.
 - (2) Further extension of the Single Program Element Funding Concept.
 - (3) Restructuring of Exploratory Development personnel ROTE programs.

The funding information used in these volumes corresponds to that contained in the President's Budget except for FY 1980. FY 1980 funds in the President's Budget are not restructured. The attached Descriptive Summaries have the FY 1980 column restructured to reflect more realistic historical information. Procurement data is shown where applicable for items in engineering or operational development. Military construction data is shown where applicable.

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✓ Amended
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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.01.A

DOD Mission Area: #256 - Tactical Communications

Title: Communications Engineering Development

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
TOTAL FOR PROGRAM ELEMENT		5483	4729	9152	13918		
QUANTITIES							*
D487	Tactical Multichannel Communications	2948	2532	6516	10053	Continuing	Not Applicable
D489	Tactical Net Radio Communications	2535	2197	2636	3865	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 equipment. These items include cable/wire systems, telephone/data/record traffic terminals, data distribution equipment/systems, equipment shelters and tracked command post assemblages, antenna configurations, multichannel radio/multiplexer/technical control assemblages, antenna masts, radio couplers and ancillary equipment that increase the reliability, extend the useful life, and/or provide interoperability with equipment inventory. The equipment developed under this program is needed to provide tactical commanders with reliable, secure, efficient communications devices and ancillary items. It includes specific R&D engineering development of single-channel radios and ancillaries for both current and future tactical radio systems.

C. (U) BASIS FOR FY 1982 RDTE REQUEST:

1. (U) Continue full-scale development (FSD) of a Long-Haul Fiber Optics Transmission System to replace the current CX-11230 metallic cable assembly. Award prototype hardware contract. Initiate FSD of a Multichannel Command Post Radio

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

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

(Millimeter Wave). Develop Test Program Sets used with Automatic Test Equipment for several items of communications equipment to provide General Support level repair capability not now available. Initiate program to examine in detail the intricacies of sophisticated communications management techniques as they apply to Army systems. Portions of the TRI-TAC Communications Control Facility (TCCF) will be used as a vehicle to perform this analysis. By this timeframe, the conceptual framework for the implementation of the INTACS Objective System will have been firmly established. System-level communications experiments will be designed to validate each of the critical interface paths and/or develop alternatives to ensure that the appropriate objectives have been met.

2. (U) Continue to provide Engineering Development technical support for the Special Forces Burst Communications System (SFBCS), for Army Marinecraft radio equipment and for ancillary equipment related to the Single-Channel Ground and Airborne Radio Subsystem (SINGARS-V). Continue engineering development effort on Tactical Net Radio Communications (TRACS) to enhance the operational capability in the field. Single-channel combat net radios in the VHF frequency range represent the primary means of communications for the US Army at the brigade level and lower. The bulk of the tactical communications in the Army is in the VHF arena and all of project D488 relates to VHF radios and associated ancillary developments.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5483	4729	9152	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	5243	4823	22783	Continuing	Not Applicable

Increase in FY 1980 due to reprogramming to support SINGARS-V. Decrease in FY 1981 due to application of general Congressional reductions. Decrease in FY 1982 attributable to transfer of Project D451, Army Support of Joint Tactical Information Distribution System (JTIDS) to Program Element 6.47.02.A.

E. (U) OTHER APPROPRIATION FUNDS: Not applicable. Due to administrative error, totals for Other Procurement, Army funds were erroneously included in the 1981 submission.

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

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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop tactical communications equipment and systems that will be employed by the Army from the forward edge of the battle area through Echelons Above Corps (EAC). This program neither includes nor duplicates those systems/equipment developed under the Joint Tactical Communications (TRI-TAC) Program, the Tactical Satellite Communications Ground Environment (TACSAT-COM), and the Single Channel Ground and Airborne Radio Subsystem (SINGARS-V). This program provides product improvement and enhancement of the current families of tactical net radios and associated ancillary items plus the tactical multichannel switched system assemblages and equipment. 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, TACSATCOM, and SINGARS systems. This program develops tactical communications equipment and ancillary items for unique Army purposes (i.e., Special Forces and Marinecraft and those 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 which can be used to: (1) implement and test evolutionary system design improvements, (2) provide a facility for new equipment and subsystem integration, (3) serve as a communications software support and development center and (4) serve as a representative communications operational system analysis center. Equipment being developed in D488 is:

- (1) (U) Transceiver Multiplexer - A device which permits more than one Tactical VHF/PP Net Radio to share a single broadband antenna.
- (2) (U) Steerable Null Antenna Processor (SNAP) - provides an electronic means of nulling or reducing interference from a jamming source to a level that allows sustained reliable friendly communications.
- (3) (U) Survivable Low-Profile Antenna - a broadband antenna with a low profile to fit into the silhouette on an armed vehicle.
- (4) (U) Portable UHF/AM Transceiver - lightweight, securable ground-to-air transceiver to replace the obsolete AN/PRC-41 currently in use.

G. (U) RELATED ACTIVITIES: Program Element 6.27.01.A, Communications - Electronics, and Program Element 6.37.07.A Communications Development, provide Exploratory and Advanced Developments that are continued into Engineering Development by this program. This program supports Program Element 6.37.46.A, Single-Channel Ground and Airborne Radio Subsystem (SINGARS-V) for ancillary equipment/components such as antenna, amplifiers, etc. This program does not duplicate other DOD efforts. Close liaison is maintained with other program managers to ensure duplication does not occur.

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

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

H. (U) WORK PERFORMED BY: During FY 1980, MITRE Corporation, Bedford, MA, was contracted to provide system engineering support for the long-haul fiber optics transmission system. This effort will continue into FY81. In FY 1980, MITEL Corp., Canada, was awarded a contract to provide a prototype SB-3614 Switchboard Nato Interface Unit (NIU). During FY 1980, a contract with Systems Development Corporation, Eatontown, NJ, was awarded as part of a CENCOMS (Center for Communications Systems) program to design, specify and implement an operational Communications Systems Design Center. In-house work performed by Project Manager, Army Tactical Communications Systems (ATACS), Fort Monmouth, NJ, and by Center for Communications Systems (CENCOMS), Fort Monmouth, NJ, and Project Manager, Single-Channel Ground and Airborne Radio System (SINGARS).

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Continued work in the definition phase of Fiber Optics Long-Haul Cable System which included contractual support effort by MITRE Corporation that will lead to system definition and design criteria. Awarded contract for prototype of SB-3614 NATO Interface Unit. Provided funds for the development contract on the Product Improvement Program for AN/TTC-38 (DC-DC converters). Provided funding for in-house development to correct compatibility problem of GRC-103 and GRC-50 radios. Conducted in-house development effort of Interim Message Facility for AN/TSC-58. Initiated contractual engineering support efforts in support of Project Manager operations. Initiated plans for Communications Support Design Center. Awarded engineering development contract for SNAP-I antenna. Awarded limited procurement contract for Transceiver Multiplexer.

2. (U) FY 1981 Program: Continue definition phase of Fiber Optics Long-Haul Cable System. Continue MITRE Corporation contractual support effort for Fiber Optics Program. Prepare system definition for Remote Programmer for SB-3614 NATO Interface Unit and engineering development of Millimeter Wave Multichannel Command Post Radio. Continue contract to provide design support for the Communications Systems Design Facility. Procure Electronic Countermeasures (ECM) emitter simulator, which provides the capability to simulate and generate enemy ECM waveforms to evaluate the effectiveness of present and future communications equipment against enemy jamming capabilities. Continue contractual engineering support efforts in support of Project Manager Operations. Continue development of Survivable Low-Profile Antenna, High-Power Linear RF Amplifier, and the AN/PRC-68. Obtain limited production approval for SNAP-I.

3. (U) FY 1982 Planned Program: Continue in-house support of Long-Haul Fiber Optics transmission system and Millimeter Wave Multichannel Command Post Radio. Initiate in-house system definition and depot development effort of Tracked CP assemblies. Initiate system definition of Local Distribution Fiber Optics Transmission System. Execute prototype hardware contract for both Long-Haul Fiber Optics Transmission System and Millimeter Wave Multichannel Command Post Radio System. Continue MITRE Corporation contractual support effort for fiber optics. Complete planning for and integration of equipment

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

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

into the Communications Design Facility. Initiate tests for present multichannel systems to determine methods of increasing ECCM capabilities. Continue contractual engineering support efforts in support of Project Manager operations. For all FY82 new starts, all necessary experimental work will be performed, and the proposed systems will be ready for full-scale development. Award engineering development contract for Survivable Low-Profile Antenna. Prepare Technical Data Package for planned ED award in FY83 on High-Power Linear RF Amplifier. Obtain type classification of AN/PRC-113. Develop medium-speed modem for Burst Communications System.

4. (U) FY 1983 Planned Program: Continue in-house support of Long-Haul Fiber Optics Transmission System, Local Distribution Transmission System, Millimeter Wave Multichannel CP Radio, and Tracked CP Assemblages. Initiate DT/T II of Long-Haul Fiber Optics Transmission System prototype. Continue depot prototype of Tracked CP Assemblage. Initiate depot prototype of new Shelterized Assemblage. Execute second increment of Long-Haul Fiber Optics Transmission System prototype and Millimeter Wave Multichannel Command Post Radio. Continue contractual support efforts for fiber optics program by MITRE Corporation. Plan for integration of TRI-TAC equipment into the Communications Design Facility. Test interoperability of ATACS and TRI-TAC systems. Continue contractual engineering support efforts in support of Project Manager Operations.

5. (U) Program to Completion: Project D-487 is a continuing program. In the FY 84-87 period, primary emphasis will be on the following: Continue development of Local Distribution Fiber Optics System and Millimeter Wave Multichannel Command Post Radio. Initiate development effort on Mobile Intercept Resistant Radio (MISR). Continue MITRE support for local Distribution Fiber Optics program. Complete DT/OT II Testing of Local Distribution Fiber Optics Program. Complete Tracked CP Assemblage Program, New Shelterized Assemblages Program, and Mobile Intercept Resistant Radio Program and convene DEVA IPR's. Initiate Objective High-Frequency Radio (OHFR) Development Program, Secure Fiber Optics Cable System Program, and Tactical Antenna Systems development effort. Continue support of Communications System Design Facility.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: D487

Program Element: #6.47.01.A

DOD Mission Area: #256 - Tactical Communications

Title: Tactical Multichannel

Title: Communications Engineering Development

Budget Activity: #6 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to develop tactical communications equipment and systems that will be employed by the Army from the forward edge of the battle area through Echelons Above Corps (EAC). This program neither includes nor duplicates those systems/equipment developed under the Joint Tactical Communications (TRI-TAC) Program, the Tactical Satellite Communications Ground Environment (TACSAT-COM), and the Single-Channel Ground and Airborne Radio Subsystem (SINCGARS-V). This program provides product improvement and enhancement of the tactical multichannel switched system assemblies and equipment. 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, TACSATCOM, and SINCGARS systems. This program develops tactical communications equipment and ancillary items for unique Army purposes and those 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 which can be used to: (1) implement and test evolutionary system design improvements, (2) provide a facility for new equipment and subsystem integration, (3) serve as a communications software support and development center, and (4) serve as a representative communications operational system analysis center.

B. (U) RELATED ACTIVITIES: Program Element 6.27.01.A., Communications - Electronics, and Program Element 6.37.07.A., Communications Development, provide Exploratory and Advanced Developments that are continued into Engineering Development by this program. This program does not duplicate other DOD efforts. Close liaison is maintained with other program managers to ensure duplication does not occur.

C. (U) WORK PERFORMED BY: During FY 1980, MITRE Corporation, Bedford, MA, was contracted to provide system engineering support for the long-haul fiber optics transmission system. This effort will continue into FY81. In FY 1980, MITEL Corp., Canada, was awarded a contract to provide a prototype SB-3614 Switchboard Nato Interface Unit (NIU). During FY 1980, a contract with Systems Development Corporation, Eatontown, NJ, was awarded as part of a CENCOMS (Center for Communications Systems) program to design, specify and implement an operational Communications Systems Design Center. In-house work performed by Project Manager, Army Tactical Communications Systems (ATACS), Fort Monmouth, NJ, and by Center for Communications Systems (CENCOMS), Fort Monmouth, NJ, and Project Manager, Single-Channel Ground and Airborne Radio System (SINCGARS).

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Project: D487

Program Element: #6.47.01.A

DOD Mission Area: #256 - Tactical Communications

Title: Tactical Multichannel

Title: Communications Engineering Development

Budget Activity: #4 - Tactical Program

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Continued work in the definition phase of Fiber Optics Long-Haul Cable System which included contractual support effort by MITRE Corporation that will lead to system definition and design criteria. Awarded contract for prototype of SB-3614 NATO interface Unit. Provided funds for the development contract on the Product Improvement Program for AN/TTC-38 (DC-DC converters). Provided funding for in-house development to correct compatibility problem of CRC-103 and CRC-50 radios. Conducted in-house development effort of Interim Message Facility for AN/TSC-58. Initiated contractual engineering support efforts in support of Project Manager operations. Initiated plans for Communications Support Design Center.

2. (U) FY 1981 Program: Continue definition phase of Fiber Optics Long-Haul Cable System. Continue MITRE Corporation contractual support effort for Fiber Optics Program. Prepare system definition for Remote Programmer for SB-3614 NATO interface Unit and engineering development of Millimeter Wave Multichannel Command Post Radio. Continue contract to provide design support for the Communications Systems Design Facility. Procure Electronic Countermeasures (ECM) emitter simulator, which provides the capability to simulate and generate enemy ECM waveforms to evaluate the effectiveness of present and future communications equipment against enemy jamming capabilities. Continue contractual engineering support efforts in support of Project Manager Operations.

3. (U) FY 1982 Planned Program: Continue in-house support of Long-Haul Fiber Optics transmission system and Millimeter Wave Multichannel Command Post Radio. Initiate in-house system definition and depot development effort of Tracked CP assemblages. Initiate system definition of Local Distribution Fiber Optics Transmission System. Execute prototype hardware contract for both Long-Haul Fiber Optics Transmission System and Millimeter Wave Multichannel Command Post Radio System. Continue MITRE Corporation contractual support effort for fiber optics. Complete planning for and integration of equipment into the Communications Design Facility. Initiate tests for present multichannel systems to determine methods of increasing ECCM capabilities. Continue contractual engineering support efforts in support of Project Manager operations. For all FY82 new starts, all necessary experimental work will be performed, and the proposed systems will be ready for full-scale development.

4. (U) FY 1983 Planned Program: Continue in-house support of Long-Haul Fiber Optics Transmission System, Local Distribution Transmission System, Millimeter Wave Multichannel CP Radio, and Tracked CP Assemblages. Initiate DT/T II of Long-Haul Fiber Optics Transmission System prototype. Continue depot prototype of Tracked CP Assemblage. Initiate depot prototype of new Shelterized Assemblage. Execute second increment of Long-Haul Fiber Optics Transmission System prototype

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Project: D487

Program Element: #0.47.01.A

DOD Mission Area: #256 - Tactical Communications

Title: Tactical Multichannel

Title: Communications Engineering Development

Budget Activity: #4 - Tactical Programs

and Millimeter Wave Multichannel Command Post Radio. Continue contractual support efforts for fiber optics program by MITRE Corporation. Plan for integration of TRI-TAC equipment into the Communications Design Facility. Test interoperability of ATACS and TRI-TAC systems. Continue contractual engineering support efforts in support of Project Manager Operations.

5. (U) Program to Completion: Project is a continuing program. In the FY 84-87 period, primary emphasis will be on the following: Continue development of Local Distribution Fiber Optics System and Millimeter Wave Multichannel Command Post Radio. Initiate development effort on Mobile Intercept Resistant Radio (MISR). Continue MITRE support for Local Distribution Fiber Optics program. Complete DT/OT II Testing of Local Distribution Fiber Optics Program. Complete Tracked CP Assemblage Program, New Shelterized Assemblages Program, and Mobile Intercept Resistant Radio Program and convene DEVA IPR's. Initiate Objective High-Frequency Radio (OHFR) Development Program, Secure Fiber Optics Cable System Program, and Tactical Antenna Systems development effort. Continue support of Communications System Design Facility.

6. (U) Resources (\$ in thousands):

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimate Cost
RDTE						
Funds (current requirements)	2948	2532	6516	10053	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3283	2593	8680	Not Shown	Not Applicable	Not Applicable

Other Appropriations: Not Applicable.

Decreases in FY 1980 and FY 1982 are due to reprogramming of funds to higher priority requirements. Decrease in FY 1981 is attributable to general Congressional reductions.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.02.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Information Distribution System (JTIDS)
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	0	16222	14892	32371	63485
D451	Army Support of JTIDS	0	0	16222	14892	32371	63485

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Based on Combat experiences in Southeast Asia and lessons learned from the Mideast War, existing US military communications systems have limited capability to effectively operate in intense jamming environments. Without communications, the effectiveness of multimillion dollar weapon systems as well as timeliness of needed information is degraded. As a result, communication links are a natural target for enemy electronic countermeasures particularly when disrupting communications for a short time can yield an immediate advantage to the enemy. The Joint Tactical Information System (JTIDS) is a joint service program to develop and acquire an integrated tactical communications, navigation, and identifications system which is secure and jam resistant. The Army's program is structured to capitalize on previous Air Force/Navy JTIDS efforts which will support Army's development of the JTIDS architecture for the Army ground environment. JTIDS will be an integral part of the Army Data Distribution System being developed under program element #6.37.13.A.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: The Army JTIDS program will be in Engineering Development in FY 1982 as part of a joint Air Force/Army Program. Class 2 terminal will be developed for tactical applications. Net management studies will be conducted to determine static/dynamic net management concepts. Maintenance and logistics plans will be developed and initial work will begin on the development of skill performance aids. Close coordination will be established with the Army Data Distribution (ADDS) program (Program Element #6.37.13.A/D370). RDTE costs are based on an independent government estimate verified by the Joint Logistics Commanders. The estimates are felt to be valid and will be the basis for a firm fixed price Full-Scale Development contract.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
DSARC II	Jan 81	Not shown
DSARC III	3d Qtr FY 1986	Not shown

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

Program Element: #6.47.02.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Information Distribution System (JTIDS)
Budget Activity: #4 - Tactical Programs

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	0	0	16222	47263	63485
Funds (as shown in FY 1981 submission)	not shown	not shown	not shown	not shown	not shown

Program transitioned to this 6.47.02.A program element from program element #6.37.07.A.

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

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Program Element: #6.47.02.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Information Distribution System (JTIDS)

Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Joint Tactical Information Distribution System (JTIDS) is a joint Service development and acquisition program to provide a high-capacity, jam-resistant, secure digital communications system with inherent relative navigation and indirect identification capabilities. In 1977 the JTIDS Joint Program Office (JPO) acquired engineering developmental model (EDM) Time Division Multiple Access (TDMA) JTIDS terminals. These terminals, designated Class 1 (AN/URQ-31), were for use on command and control (C2) platforms. Terminal testing was accomplished and Class 1 production contract was subsequently awarded in July 1980. The need for a JTIDS capability in mobile ground and air tactical platforms resulted in the development of a smaller sized Advanced Development Model (ADM) Class 2 TDMA terminal, designated the AN/URQ-28. DTSE testing of the AN/URQ-28 terminal was completed in 1979. A pod-mounted configuration of the AN/URQ-28 is currently in testing. The primary Army FSD objective is to obtain the JTIDS terminals needed to support developmental testing and deployment of the Position Location Reporting System (PLRS)/JTIDS Hybrid (PJH) System. If integration and testing are successful, the Army requirements for digital information distribution among the Battlefield Automated Systems of the 1980's will be satisfied. JTIDS terminals in the PJH System will provide a communications support capability for existing and programmed automated systems for Air Defense/Field Artillery, and Command and Control. These terminals will enable highly sophisticated and highly-effective weapons systems fielded in the early 1980's and beyond to operate to their full potential.

G. (U) RELATED ACTIVITIES: JTIDS will be an integral part of the Army Data Distribution System (ADDS) being developed under Program Element #6.37.13.A. This is a joint development with the Air Force under Program Element #6.47.54.F.

H. (U) WORK PERFORMED BY: In-house developing agencies are the US Army Communications Research and Development Command (CORADCOM), the US Army Electronics Research and Development Command (ERADCOM). Contracted efforts include MITRE Corporation, Bedford, MA; Hughes Aircraft Company, Fullerton, CA; Network Analysis Corporation, Great Neck, NY; IBM, Federal Systems Division, Oswego, NY; Singer-Kearfott Co, Little Falls, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Participated in studies relating Army applications of JTIDS. Identified and incorporated Army requirements into the JTIDS Adaptable Surface Interface Terminal (ASIT) and the AN/TSQ-73 Air Defense system. Class 2 terminal request for Proposal released to industry. Program revision provided by Office of Secretary of Defense, Research and Engineering to continue with Class 2 terminal activity with Time Division Multiple Access (TDMA) architecture as the baseline JTIDS technology. Conducted interoperability testing with the AN/TSQ-73 Missile Minder Air Defense System and ground propagation testing at Eglin Air Force Base.

2. (U) FY 1981 Program: Program will enter full-scale development. Continue participation in JTIDS Class 2 terminal development efforts leading to definition and design parameters for a Class 2 terminal for Army ground environment use. The Joint Net Management analysis will be completed, and the assessment of the suitability of JTIDS architecture will continue.

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Program Element: #6.47.02.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Information Distribution System (JTIDS)

Budget Activity: #4 - Tactical Programs

to ensure that Army requirements are properly considered. Began tech data exchange between JTIDS and PLRS to establish initial testbed activity in support of Army Data Distribution System.

3. (U) FY 1982 Planned Program: Continue full-scale development of the JTIDS Class 2 Time Division Multiple Access (TDMA) terminal. Expand information exchange with the Army Data Distribution System (ADDS) system to allow for net management development. Begin development of maintenance and logistic support packages and skill performance aids. Monitor ADDS Phase 3 system integration testing of AN/TPQ-36 and AN/TPQ-37 radars, I-Hawk Firing Battery, and AN/TSQ-73 radar and assist when required.

4. (U) FY 1983 Planned Program: Continue full-scale development. Deliver five engineering development models of the JTIDS Class 2 TDMA terminal to the ADDS Phase 4 testbed. These terminals will be integrated into the Short Range Air Defense Command and Control testbed. Continue development of maintenance and logistic support packages and skill performance aids.

5. (U) Program to Completion: Complete full-scale development of the TDMA Class 2 terminal. Deliver 50 engineering development terminals (funded in Program Element #63713A) to the ADDS Phase 5 testbed. Complete maintenance and logistics packages and skill performance aids. JTIDS will be fielded as part of the ADDS system with an IOC of FY86.

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Program Element: #6.47.02.A
DOD Mission Area: #236 - Tactical Communication

Title: Communication
Budget Activity: #4 - Tactical Programs

1. (U) Test and Evaluation Data

1. (U) Development Test and Evaluation:

a. (U) The Army will participate with the Air Force in the Development and Operational tests of the Class 2 engineering development terminal; however, the bulk of Army testing will be accomplished during integration of this terminal with the Position Location Reporting System (PLRS), to form the PLRS/JTIDS Hybrid System (PJH) also known as the Army Data Distribution System (ADDS), Program Element #6.37.13-A, Joint Information Distribution Systems, Project D179, Army Data Distribution System. FY82 testing will verify the operation of existing and available versions of the JTIDS terminal with PLRS. Initially, the JTIDS Class 1 ADM terminal will be interfaced with a PLRS Master Unit to verify data exchange and correlation of position data between the systems. Class 2 ADM terminals will also be used to expand the JTIDS complement in the testbed and examine interoperability. During FY83, testing will concentrate on interfacing JTIDS and ADDS with the AN/TPQ-36, AN/TPQ-37, and AN/TPQ-73 radars and Improved Hawk firing battery. Initial net management development will also be tested.

b. (U) The timely and reliable exchange of information has been demonstrated during more than 1000 hours of Class 1 terminal bench and flight testing with Class 1 terminals. Recently, Joint Army/Air Force efforts at Eglin Air Force Base, FL, interfaced JTIDS with the AN/TSQ-73 Missile Minder System. Previously the Army conducted ground-to-ground propagation measurements at Eglin Air Force Base and Arnold Air Force Base, TN. A mean time between mission failure of 203 hours was achieved with the Class 2 Advanced Development Model terminal. The requirement was 200 hours.

2. (U) Operational Test and Evaluation: Operational tests will be done in conjunction with the Position Location Reporting System (PLRS)/JTIDS Hybrid Operational Testing in FY84 through FY85. During FY84 five engineering development models of the Class 2 terminal will be integrated into the Hybrid and tested in the short-range Air Defense Command and Control test at Fort Bliss. During FY85 and FY86 an additional fifty terminals will be integrated with a Division set of PLRS and tested with the 1st Cavalry Division at Fort Hood, TX. This test will be the basis for type classification of the system in FY86.

3. (U) System Characteristics: Initial requirements as listed in the JTIDS test and evaluation master plan are given below:

Program Element: #6.47.02.A

DOD Mission Area: 2256 - Tactical Communication

Title: Communication

Budget Activity: 14 - Tactical Programs

a. (U) Contractual Suitability Specifications.

SEGMENT SPEC	MTBF (GROUND) (hrs)	MTBF (AIRBORNE) (hrs)	MTBF (SHIPBORNE) (hrs)	MAX REPAIR TIME (min)	MTTR (min)
(U) CLASS 1	630	350	TBD	30	15
(U) AN/TSC-106	600	---	---	102	36
(U) CLASS 2	TBD	500	TBD	90	30
(U) CLASS 3	TBD	TBD	TBD	TBD	TBD

b. (U) Technical Characteristics.

CHARACTERISTICS	GOAL	THRESHOLDS
(U) TDMA		
Coded Data Rate (1 net)		
Coded Message Error Probability (for a 210 Bit message)		
Independent Simul Nets		
Jam Resistance		
Relay		
Time of Arrival Ranging Accuracy (at 150 nm)		
Relative Positioning Accuracy		
Communications Range		
Voice Channels		
(U) Supportability		
(U) Mean Time Between Failure	120	102
(U) Mean Time to Repair	30 min.	60 min.

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimate Cost
	TOTAL FOR PROGRAM ELEMENT	3999	3595	6948	TBD	0	TBD
DL73	Remotely Monitored Battlefield Sensor System (REMBASS)	3999	3595	6948	TBD	0	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Soviet force superiority in manpower and hardware make early detection of those forces under all weather, terrain, and electronic countermeasures conditions mandatory if the Army is to be successful on future battlefields. The REMBASS program meets this challenge with a hand-emplaced passive all-weather Unattended Ground Sensor (UGS) system capable of 24-hour operation anywhere in the world by FY 1984. REMBASS equipment will improve the Army's capability for early warning alert, ground surveillance, and target development in an active countermeasures environment and during all conditions of weather, terrain, and visibility. This system consists of readout and relay devices, power sources, and unattended ground sensors, including seismic acoustic classifying, magnetic, and infrared sensors.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: This year Engineering Development (ED) involves completion of design development and prototype testing of hand-emplaced sensors, relays, and readout devices in order to conduct Development Test II/Operational Test II, and a development in-process review.

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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

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	3999	3595	6948	TBD	TBD
Funds (as shown in FY 1981 submission)	2000	3918	7164	11105	44538

The FY80 increase depicts reprogramming which was required to keep the REMBASS program on schedule. The decrease in FY81 is attributable to the application of general Congressional reductions and reductions for improved efficiencies. The FY82 request reflects the amount programmed for President Reagan's FY82 Amendment after the Army had zeroed REMBASS in FY82 and outyears in the Initial President's FY82 Budget.

E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands) None.

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Program Element: 06.47.04.A

DOD Mission Area: #255 Tactical Surveillance,
Reconnaissance & Target Acquisition

Title: Unattended Ground Sensors (UGS)

Budget Activity: #4 - Tactical Program

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 1966 and 1973. Selected Advanced Development (AD) models were tested and transitioned into engineering development (ED) as REMBASS. A hand-emplaced sensor system, REMBASS employs a variety of sensor types including magnetic, 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 January 1980 demonstrated that the probability of the REMBASS classifying sensor correctly identifying personnel is 100%, wheeled vehicles is 61%, and tracked vehicles is 91%.

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. The Department of Defense Physical Security Equipment Action Group (PSEAG) 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. 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, state law enforcement agencies, and hazard waste strike forces. 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). This program element is the Engineering Development (ED) 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 Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA; Human Engineering Laboratory (HEL), Aberdeen Proving Ground, MD; and 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; and Value Service Engineering, West Long Branch, NJ.

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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

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: A Validation In-Process Review (IPR) for basic components of the REMBASS to enter Engineering Development (ED) was approved by the Department of the Army on 17 May 1976. Three design plan contracts were awarded: one each to GTE Sylvania, RCA Corporation, and American Electronics Laboratory. A Special IPR was conducted on 10 May 1977 to finalize the coordinated developer/user configuration for basic REMBASS. Based on evaluation of the resulting design plans, an engineering development contract was awarded in June 1977 to RCA Corporation. Commander, European Command, initiated a combined (Germany, United Kingdom, and United States) study program, AVID GUARDIAN, which on its completion in July 1977 proved conclusively that unattended ground sensors perform reliably and effectively under European conditions of heavy military traffic, high speeds, and severe weather. Army Remote Sensors (REMS) were used to provide security of the Olympic Village complex at the Lake Placid Winter Olympics against unauthorized intrusion.

2. (U) FY 1981 Program: Continue Engineering Development contract for REMBASS hand-emplaced hardware and conduct final design review.

3. (U) FY 1982 Planned Program: Complete hand-emplaced hardware fabrication, conduct DT II/OT II, and conduct development In-Process Review (IPR).

4. (U) FY 1983 Planned Program: Complete approved Engineering Change Proposals (ECP) developed from DT/OT II and finalize documentation and reports for a production data package.

5. (U) Program to Completion: Continue completion of ECP's and finalization of documentation reports as required.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.47.05.A Title: Modular Integrated Communication and Navigation System (MICNS)
 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	0	0	18000	6400	TBD	TBD
D207	Modular Integrated Communications and Navigation System (MICNS)	0	0	18000	6400	TBD	TBD

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: US forces face highly mobile and heavily mechanized forces which will make maximum use of Electronic Countermeasures (ECM) to render US systems ineffective. The MICNS project will meet this challenge through the development of modular anti-jam data link components which will meet the Electronic Counter-Countermeasures (ECCM) needs of the Army's

The MICNS will improve US force's capability
in the face of intensive opposing force's electronic countermeasures.

C. BASIS FOR FY 1982 RDTE REQUEST: To provide FY82 incremental funding for the MICNS Engineering Development (ED) contract for hardware design and fabrication awarded in FY79 and to develop coordinated test plans for Development Testing II and Operational Testing II. Engineering Development contract was awarded in FY79.

Program Element: 6.47.05.A Title: Modular Integrated Communication and Navigation System (MICNS)
 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 1981 Submission
OT Testing -	3Q CY83	4Q CY82 (As shown on CDS)
Production Award -	4Q CY83	2Q CY83 (As shown on CDS)
OT Testing -	1Q CY84	3Q CY81 (As shown on CDS)
Production Award -	4Q CY84	1Q CY82 (As shown on CDS)

D. COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands) This is a new program element. Prior to FY81, the MICNS ED program was funded from P.E. 47.48.A, P.E. 6.47.30.A, and P.E. 6.47.42.F.

E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands) None.

Program Element: 6.47.05.A

Title: Modular Integrated Communication and Navigation System (MICNS)

DOD Mission Area: #255 - Tactical Surveillance,
Reconnaissance, and Target Acquisition

Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to produce Engineering Development (ED) models of modular data link components for extensive user tests. The program element consists of one active project, MICNS. Feasibility of a common, modular, highly jam-resistant data link for multiple applications was proven under the advanced development program conducted between 1975 and 1978 under the 6.3 program elements. Prior to FY 1982, Engineering Development of the MICNS was funded under the Army's Program Element 6.47.48.A and Program Element 6.47.30.A and the Air Force Program Element 6.47.42.F. This separate MICNS program element commencing in FY 1982 represents a DA decision to elevate the management level of this crucial project to separate program element status in order to afford better management visibility and allow broader application of the equipment to other developing systems faced with similar ECM threats and system needs. By employing a variety of ECCM provisions, the MICNS will allow the using systems to meet the ECM/jamming threats projected to exist for the next 20 years.

G. RELATED ACTIVITIES: Prior to April 1975, initial exploratory development efforts of MICNS were jointly funded by the Army under Program Element 6.27.03A, Task DII93, and Defense Research Projects Agency, Program Element 6.27.02.E. This activity verified the basic ECCM concepts needed to develop a system suitable for

In April 1975, an advanced development program commenced with funding provided in Program Element 6.37.25.A, which demonstrated the feasibility of building an Integrated Communications and Navigation System (ICNS) which could meet the jamming threat and stringent size, weight, and power requirements. The effort was also funded from Program Element 6.47.36A,

to demonstrate the feasibility of sharing common data link components with the system. Testing of the advanced development models at Fort Huachuca during early calendar year 1978 successfully demonstrated the system concept. Advanced development was completed in FY 1978 and the program transitioned into Engineering Development (ED) with the objective of building common data link modules to meet the requirements of Army programs and

Air Force programs. Prior to FY 82, the MICNS ED program was funded from P.E. 6.47.48.A, P.E. 6.47.30.A, and P.E. 6.47.42.F.

H. (U) WORK PERFORMED BY: Responsibility for management of the MICNS project is assigned to the Project Officer, MICNS, US Army Electronic Research and Development Command (ERADCOM), Fort Monmouth, NJ, and Adelphi, MD, US Army Communication Research and Development Command (COMRADCOM), Fort Monmouth NJ, and US Army Communication and Electronic Readiness Command (CERCOM), Fort Monmouth, NJ. Contractors include Harris Corporation, Melbourne, FL, and Systems Planning Corporation, Rosslyn, VA.

Program Element: 6.47.05.A

Title: Modular Integrated Communication and Navigation System (MICNS)

DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance, and Target Acquisition

Budget Activity: #4 - Tactical Programs

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: Validation testing for basic components and ECM techniques was successfully completed on AD models at Ft Huachuca, AZ, in 1978. Full-Scale Development (ED) for was approved at the participation in the MICNS development was approved by DA at the RPV validation In-Process Review held in Sep 79. The contract for MICNS was awarded to Harris Corporation, Melbourne, FL, through a competitive procurement in May 79. Full-Scale Development continued in FY 1980. Eighty percent (80%) of system design was completed. A brassboard model of the SOTAS air-to-ground data link was demonstrated. Fabrication of large scale integrated circuits was started.

2. FY 1981 Program: Continuation of the MICNS ED contract to complete the design and fabrication of data link components for use in Development Test II and Operational Test II. Developmental Testing will commence. hardware design will be completed and fabrication of initial models will begin. Development of DT/OT support packages will begin.

3. FY 1982 Planned Program: Complete all hardware fabrication for the Systems. DT/OT will be completed. The MICNS data link will be integrated into the System. The

4. FY 1983 Planned Program: Prepare and award a production contract for MICNS data link components. Complete the integration of MICNS into the Begin the development of the MICNS field support package.

5. Program to Completion: MICNS Testing and field support packages will be completed and production contracts will be awarded to satisfy the data link hardware requirements. Throughout the MICNS project, additional application of the MICNS anti-jam data link components will be considered and incorporated into the MICNS program as appropriate.

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
TOTAL FOR PROGRAM ELEMENT QUANTITIES							
D517	Radiac Equipment Engineering Development	948	270	312	847	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Radiological survey equipment is required on the battlefield for the detection and measurement of hazardous nuclear environments. This type of equipment gives the commander the capability to know where the nuclear fallout zones are and to avoid them in the course of the battle. Urgently required aerial and vehicular radiacs are provided which will replace the current generation of handheld instruments. The aerial and vehicular radiacs will reduce both the time required for survey and the radiation hazard to the soldiers making the survey. Radiation histories of individual soldiers and units are provided so that soldiers or units approaching lethal radiation doses can be moved away from the threat environment and thereafter be 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 fallout (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 providing for automatic scale selection and digital readout. New equipment will be reduced in weight and size, and will combine the capabilities of the family of current radiac meters into single units. This will reduce the unit and man-carried load.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Engineering Development is continued (second year) on the digital radiac. This radiac, which is suitable for both tactical and health physics survey, can be used either as a handheld instrument or as part of a tank-automotive system. It is the top-priority radiac required by the European theater. Engineering Development of radiac equipment is a continuing program.

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Program Element: #6.47.06.A

Title: Radiological Defense Equipment

DOD Mission Area: #215 - Land Combat Support

Budget Activity: #4 - Tactical Programs

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

*IOC - Initial Operational Capability

**TC - Type Classification

IOC of the installation monitor system will be delayed until FY83 because of late receipt of the Independent Evaluation Report from the tester.

D. (U) COMPARISON WITH FY 1981 REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	948	270	312	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	948	290	0	Continuing	Not Applicable

The FY 1981 funds decrease reflects the application of general Congressional reductions. Funds have been increased from \$0 to \$312 thousand in 1982 due to a higher priority on fielding digital radiac equipment. The digital radiac has been designated a POMCUS (prepositioning of material configured to unit sets) fill item.

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

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

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Other Procurement Army Funds (current requirements)	3500	3800	3800	2000	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3500	3700	3700	-	Continuing	Not Applicable

Quantities (Numerous procurements of a variety of instruments)

The FY81 and FY82 fund estimates have been increased by \$100 thousand because of refinements in unit price and small modifications to delivery schedules.

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

Title: Radiological Defense Equipment
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, do not measure prompt radiation, and do not provide an audio alarm to the threatened soldier. Currently there is no rapid aerial or vehicular 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 to fight on the modern nuclear battlefield. 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 for measurement of 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 radiax system will be mounted in armored fighting vehicles and can effectively monitor outside fallout radiation levels from within the vehicle. The vehicular radiax may also be used in a dismounted role. The aerial radiax will be mounted in Army aircraft or in remotely piloted vehicles. It will automatically correct for altitude, and then compute and record the ground dose rate. Computer data links will enable near-realtime fallout plotting. 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 a one-meter 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 autoranging and digital readout.

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. The effort and direction of this program is not duplicated by other programs within the DOD. 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 radiax system was developed to be compatible with all armored fighting vehicles. Liaison with other Services is maintained through the Tri-Services Radiax 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

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

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

(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.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Initiated action to put the German-developed individual dosimeter system in competition with the jointly developed United States (US)-United Kingdom (UK) individual dosimeter system. Continued low-rate initial production for the aerial radiac. Type classified standard the tactical dosimeter and awarded initial production contract.

2. (U) FY 1981 Program: Complete advanced development of digital radiac, initiate engineering development. Select either the US-UK or the German individual dosimeter system for Army use. Type classify the X-ray probe for the alpha survey meter and initiate production. Type classify the installation monitor system, and initiate procurement.

3. (U) FY 1982 Planned Program: Initiate procurement of the individual dosimeter system. Continue production of the tactical dosimeter and X-ray probe. Continue engineering development of the digital radiac.

4. (U) FY 1983 Planned Program: Type classify the digital radiac as standard; initiate production and procurement. Continue procurement of tactical dosimeter; complete procurement of the X-ray probe for alpha survey meter.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 86.47.09.A

DOD Mission Area: #254 - Tactical Command and Control

Title: Identification Friend or Foe (IFF) Equipment

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	900	3010	2473	5242	Continuing	Not Applicable
D530	IFF Equipment	900	3010	2473	5242	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 applications. Programs include: (1) new applications of and improvements to the existing Mark XII air defense IFF system; (2) development of signal processing techniques and equipment for the noncooperative identification of aircraft by selected weapon platforms, to enable positive identification of foes and friends with malfunctioning transponders, and (3) a multifunction radar transponder beacon for use by Special Forces in covert operations.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Award contract for engineering development models of an airborne interrogator for the SCOUT helicopter self-protection missile system, continue engineering development of the multifunction radar transponder beacon, and continue development of Mark XII improvements.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Award Contract, Multifunction Beacon	FY81	-
Award Contract, MK XII Interr. for Defense Acquisition Radar	FY81	FY80

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Program Element: #6.47.09.A

DOD Mission Area: #254 - Tactical Command and Control

Title: Identification Friend or Foe (IFF) Equipment

Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Award Contract, MK XII Interr. for SCOUT helicopter	FY82	-
Award Contract, MK XII Interr. for SHORAD C ²	FY83	-
Award Contract, Noncooperative IFF for HAWK	FY83	-

Contract for construction of engineering development models of an MK XII Interrogator for the Defense Acquisition Radar, previously scheduled for FY 1980 award, has been deferred to FY 1981 due to delays in approval of requirements for the overall system.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Estimated Cost
RDTE					
Funds (current requirements)	900	3010	2473	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	1700	3233	6009	Continuing	Not Applicable

Decrease of \$800 thousand in FY80 was due to reprogramming to a higher priority project. Project D530 has decreased from \$6009 to \$2473 in FY 1982, reflecting replacement of engineering development of the NATO Identification System (NIS) by planned contract for MK XII Interrogator for SCOUT helicopter self-protection missile system, and test of multifunction radar transponder beacon. The FY81 decrease reflects the application of general Congressional reductions.

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

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Program Element: #6.47.09.A
DOD Mission Area: #254 - Tactical Command and Control

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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The existing air defense IFF system, the Mark XII system, is in use by all three services. All military aircraft are capable of responding to Mark XII cryptographic interrogations. New weapon systems can take advantage of this system by incorporating an IFF interrogator. Versions of Mark XII interrogators are, therefore, planned for the Defense Acquisition Radar (DAR), the SCOUT helicopter self-protection missile system, and the SHORAD Command and Control (C²) system. Because the MK XII is based on 30-year-old technology, improvements both to individual equipment and to the system, are being sought to enable the Mark XII to perform its function until the time when it will be supplanted by the next-generation system (Mark (), part of the NATO Identification System). 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. 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. Finally, a multifunction radar transponder beacon is being sought by Special Forces units, to facilitate their location and identification by AF 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) Mark XII improvements and Noncooperative Identification are accomplished under Program Element 6.37.06.A, IFF Developments. Air Force and Navy are participants in the Joint Service development of the Combat Identification System (CIS), 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.

H. (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. Application to the SCOUT helicopter would be based on the STINGER Interrogator (AN/PPX-3) built by Telelynne Electronics of Newbury Park, CA. The Bendix Corporation of Towson, MD, is a participant in the Mark XII improvement program. Noncooperative IFF for HAWK would be constructed by SCOPE, Inc., of Reston, VA. The multifunction radar transponder beacon would be accomplished by Motorola in Phoenix, AZ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: In FY 1981, groundwork was laid for the start of development of the multifunction radar transponder beacon. In years past, this program element funded engineering development of the MK XII system, including applications for NIKE, HAWK, GSS-1, and FAAR (Forward Area Acquisition Radar).

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Program Element: #6.47.09.A

DOD Mission Area: #254 - Tactical Command and Control

Title: Identification Friend or Foe (IFF) Equipment

Budget Activity: #4 - Tactical Programs

2. (U) FY 1981 Program: Award contract for engineering development models of multifunction radar transponder beacon, for use by Special Forces. Award contract for MK XII interrogator for the new Defense Acquisition Radar. Interrogator will be a modification of the AN/TPX-46 used with HAWK.
3. (U) FY 1982 Planned Program: Continue contracts for application of MK XII to the Defense Acquisition Radar, and for the multifunction transponder beacon, which will begin testing. Award contract for engineering development models of a Mark XII interrogator for the SCOUT self-protection helicopter, based on the AN/PPX-3 interrogator developed for ST NGER. All necessary experimental work will be performed, and the proposed systems will be ready for full-scale development.
4. (U) FY 1983 Planned Program: Test MK XII interrogators for Defense Acquisition Radar and SCOUT helicopter. Award contract for MK XII interrogator for SHORAD C², based on the AN/TPX-50 developed for FAAR. Award a contract for engineering development models of a noncooperative IFF signal processor for Improved HAWK.
5. (U) Program to Completion: This is a continuing program. Future efforts will include engineering development models of noncooperative IFF for PATRIOT, and ED models of the NATO Identification System (Mark () and BIFF), for both air defense and battlefield applications.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

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

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	3000	5778	5434	5493	Continuing	Not Applicable
DL70	Night Vision Devices	3000	5778	5434	5493	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 minimal by making maximum use of common sensors in the night sights of as many weapon systems as possible, and by making technology compatible with existing sights.

C. (U) BASIS FOR FY 1982 RDT&E REQUEST: Engineering Development will be completed for the high-performance, lightweight Aviator's Night Vision Imaging System (ANVIS) that will enable nap-of-the-earth flight operations under starlight and overcast starlight. The program for the ANVIS will then transition to production. The low-cost night vision aid will transition to engineering development. This device will also make possible the fielding of other night vision aids for the individual soldier in the numbers required at a cost which can be afforded by the Army.

D. (U) COMPARISON WITH FY 1981 RDT&E REQUEST: (\$ in thousands)

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

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

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	3000	5778	5434	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3000	6032	9251	Continuing	Not Applicable

The FY 1981 reduction reflects the application of general Congressional reductions. Decrease in FY 1982 (\$3817) was due to program realignment and higher priority projects.

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

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Program Element: #6.41.10.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 Vision 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 1980 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). Continued Engineering Development of Aviator's Night Vision Imaging System (ANVIS) and started Development Test II and Operational Test II.

2. (U) FY 1981 Program: Complete Engineering Development of Aviator's Night Vision Imaging System (ANVIS). Development and Operational Tests will be completed, maintenance and support concepts will be finalized, and engineering changes made. Conduct Development Acceptance In-Process Review. Complete Validation In-Process Review for low-cost night vision aids.

3. (U) FY 1982 Planned Program: Transition Aviator's Night Vision Imaging System (ANVIS) to production. Transition additional low-cost night vision aids to Engineering Development. Fabricate Engineering Development model aids based on eval-

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Program Element: #6.47.10.A

DOD Mission Area: #215 - Land Combat Support

Title: Night Vision Devices

Budget Activity: #4 - Tactical Programs

uction of competitive models from Advanced Development. All necessary experimental work will be performed, and the proposed system will be ready for full-scale development.

4. (U) FY 1983 Planned Program: 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.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

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

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6868	11574	16446	21103		Not Applicable
	QUANTITIES						Not Applicable
DC52	Scout/Attack Helicopter Survivability Systems	3150	6697	7323	8324	Continuing	Not Applicable
D665	Special Electronic Mission Aircraft Survivability Systems	3718	4877	9123	12779	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 substantiated user requirements based on documented threat, and the Required Operational Capability (ROC) for Aircraft Survivability Equipment (ASE) for both current and developmental Army aircraft.

C. (U) BASIS FOR FY 1982 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 pri-

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Program Element: 35.47.11.A

DOD Mission Area: #257 - Electronic Warfare
& Counter-C I

Title: Aircraft Electronic Warfare (EW) Self-Protection Systems

Budget Activity: #4 - Tactical Programs

marily anti-air systems but also include main tank guns, antitank guided missiles, and the HIND helicopter. Laser designators and rangefinders associated with these systems represent an ever-increasing threat to the survival and combat effectiveness of Army tactical aircraft. This program completes the engineering development and testing for the AVR-2 laser warning receiver for production in FY83. 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 special electronic mission aircraft (SEMA) version of the ALQ-156 missile detector, the UH/EH-60 Blackhawk helicopter IR suppressor, and the continuation 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 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. Millimeter chaff and monopulse expendables as well as the Army's portion of the Tri-Service Airborne Self-Protection Jammer (ASPJ) program are included in FY82 program.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	6868	11574	16446	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	9928	12322	21055	Continuing	Not Applicable

The FY80 decrease reflects an internal Army reprogramming action for a higher priority project. The task affected was the SEMA version of the AN/ALQ-136. FY81 decreases are attributable to inflation changes.

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

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

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Aircraft Procurement, Army						
Funds (current requirements)	44379	25677	47304	41606	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	54479	31677	50480	-	Continuing	Not Applicable
Quantities (current requirements)	-	-	-	-	Continuing	Not Applicable
Quantities (as shown in FY 1981 submission)	-	-	-	-	Continuing	Not Applicable

Procurement quantities include up to 17 different types of Aircraft Survivability Equipment (ASE) which support 11 separate aircraft modification lines. Therefore, it is rather meaningless to portray total quantities of equipment. This program is closely coordinated with the aircraft program. Funding and quantity differences for FY80, 81, and 82 reflect changes in ASE quantity requirements caused by changes to the aircraft production/modification schedules, fundings restrictions.

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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 Midwest. 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, 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 inter-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 1978/1979/1980 and are planned for 1981.

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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

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; Science Applications Inc., Huntsville, AL; American Electronics Laboratory, Landsdale, PA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: In response to the SA-7 missile, 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 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 1980. The APR-39(V)2 advanced radar warning receiver and ALQ-136(V)1 entered engineering development in 1977, testing completed FY80. 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), ALQ-136 Radar Jammer (FY 1980). The AVR-2 laser warning receiver entered ED under this program in FY 1979 and was incrementally funded thru FY 1980. Development required to adapt the AH-1S IR suppressor to the EH-1 special electronic mission aircraft (SEMA) and UH-1 medical

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

evacuation (MEDIVAC) aircraft was initiated in FY 1979 and continued in FY 1980. Also in FY 1979/1980 development test (DT)/operational test (OT) II were performed for the APR-39(V)2 radar warning receiver. Production validation testing was performed on the Ground Radar Emitter Trainer for Aviators (GRETA), the AH-1S suppressor and the OV-1D IR suppressor. The SEMA version of the ALQ-156 and the improved low-speed/hover IR suppressor for the UH/EH-60 BLACKHAWK helicopter were initiated in FY80, and funds for the Army's portion of the ALQ-162 Continuous Wave (CW) Radar Jammer Development were provided to the Navy. 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 1981 Program: The FY 1981 program continues the engineering development (ED) for the AVR-2 laser warning receiver, the ALQ-156 missile detector for Special Electronic Mission Aircraft (SEMA) applications, the improved low-speed/hover infrared (IR) suppressor for the UH/EH-60 BLACK HAWK 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.

3. (U) 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 BLACK HAWK 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 millimeter wave 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 monopulse 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.

4. (U) FY 1983 Planned Program: This program will continue/complete development of the Special Electronic Mission Aircraft (SEMA) (Fixed Wing Version) of the AN/ALQ-156 missile detector, the ultraviolet missile detector, DRFM for the AN/ALQ-136, radar jammer tests of monopulse countermeasures, and airborne self-protection jammer (ASPJ) for SEMA. ASPJ is a Tri-Service program. An engineering development (ED) program will be initiated for millimeter wave length chaff expendables for use in the M-130 dispenser. Also included will be flight testing of the UH/EH-60 BLACK HAWK suppressor and the pro-

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

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

cessing of engineering change orders required prior to production. Engineering Development will continue for an advanced threat warning receiver, and efforts will be initiated to incorporate advanced threat capabilities into the Ground Radar Emitter Trainer for Aviators (GRETA). GRETA is an aircrew training device mounted on a ground vehicle and is capable of generating signals representative of those emitted by threat radars. Vulnerability reduction modifications against explosive incendiary munitions and an antitank countermeasure will be initiated.

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

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FY 1982 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-C
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 equipment selected from P.E. 6.37.11.A, Aircraft Electronic Warfare (EW) Self-Protection Equipment, project DB52, Scout/Attack Helicopter survivability Equipment, which has demonstrated the capability to significantly enhance the combat effectiveness of scout and attack helicopters. The objective 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 Program Element #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 Programs, 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 Program Element #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 Army (USA) Aviation Research and Development Command (AVRAIDCOM), St. Louis, MO; US Army Electronic 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; 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; Science Applications, Inc., Huntsville, AL.

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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-C-I
Budget Activity: #6 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) **FY 1980 and Prior Accomplishments:** In response to the SA-7 missile, 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 missiles. In FY 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-10 (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 and entered production. The flat-plate canopies to reduce glare for the CH-53 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), CH-53 IR suppressor (FY 1977), OV-10 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 (MEDEVAC) aircraft was initiated in FY 1979 and continued through FY 1980. 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 1981 Program:** The FY 1981 program will complete breadboard testing and fabricate engineering development models of the AVR-2 Laser Warning Receiver and initiate full-scale development of the improved low-speed/hover infrared suppressor for the UH/EH-60 Blackhawk helicopter. Testing the Garrett Hot Metal plus plume suppressor on the attack and utility helicopter will be completed.

3. (U) **FY 1982 Planned Program:** The FY 1982 program will fund the engineering development tests for the AVR-2 Laser Warning Receiver, and continue development of the improved low-speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter. The millimeter wave radar warning receiver modifications to the basic APR-39 Radar Warning Receiver will be initiated.

4. (U) **FY 1983 Planned Program:** This program will conduct flight testing of the UH/EH-60 Blackhawk suppressor and process engineering change orders required prior to production. Engineering development will continue for an advanced threat warning receiver and will be initiated for incorporation of advanced threat capabilities into the Ground Radar

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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-C²I

Budget Activity: #4 - Tactical Programs

Emitter Trainer for Aviators (GRETA). GRETA is an aircrew training device mounted on a ground vehicle and capable of generating signals representative of those emitted by threat radars. Vulnerability reduction modifications against highexplosive incendiary munitions and an antitank guided missile countermeasure program will be initiated.

5. (U) Program to Completion: The major efforts will be the completion of the low-speed/hover IR suppressor for the UH/EH-60 Blackhawk helicopter and continuation of millimeter wave radar warning receiver program. Additionally, the ED program for the outyears will initiate development of low radar cross-section hub covers for tactical helicopters, millimeter wavelength chaff expendables for use in the M-130 chaff/flare dispenser, long-wavelength detector modification for the AVR-2 laser warning receiver, a millimeter wavelength radar jammer, the optical warning location/designation (OWL/D) system, optical jammers, and active laser countermeasures. Production validation testing will be conducted for the UH/EH-60 Blackhawk suppressor. 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.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	3150	6697	7323	8324	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3150	7097	7361	-	Continuing	Not Applicable
Other Appropriations:						
Aircraft Procurement, Army						
Funds (current requirements)	11275	4467	6570	6878	Continuing	Not Applicable

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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-C-1 Budget Activity: #4 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Funds (as shown in FY 1981 submission)	9310	5829	16045	-	Continuing	Not Applicable
Quantities (current requirements)	-	-	-	-	Continuing	Not Applicable
Quantities (as shown in FY 1981 submission)	-	-	-	-	Continuing	Not Applicable

The FY 1981 decrease reflects the application of general Congressional reductions. The difference in RDTE funding for FY82 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. Procurement quantities include up to 17 different types of Aircraft Survivability Equipment (ASE) which support 11 separate aircraft modification lines. Therefore, it is rather meaningless to portray total quantities of equipment.

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FY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #0665 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-G-2 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 anti-aircraft weapons using Infrared, radar, or optical guidance. AEWSP systems are developed after feasibility has been demonstrated under Project 0651, 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 #0652, 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 (JTCC/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, ARADCOM, 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 1980 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, completed in FY79, and a first production award made in FY80. 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

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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-1 Budget Activity: #4 - Tactical Programs

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, which includes 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. Testing of the APR-39(V)2 continued during FY80. An ED contract was awarded in FY79 for the AVR-2 Laser Warning Receiver designed to detect laser designators and/or laser rangefinders and continued through FY80. Production validation testing was performed for the Ground Radar Emitter Trainer for Aviators, an aircrew training device mounted on a ground vehicle and capable of generating signals representative of those emitted by threat radars. Engineering development was initiated for an AN/ALQ-156 (Fixed Wing) Missile Detector for special electronic mission aircraft. A study was conducted for an improved low-speed/hover infrared suppressor for the new Blackhawk helicopter. The Army participated with the Navy for engineering development models of the AN/ALQ-162 Continuous Wave (CW) Radar Jammer, being developed as a joint Army/Navy program.

2. (U) FY 1981 Program: This program continues development of AN/ALQ-156 Missile Detector to address airborne interceptors (AI) and the long-range missile threat to Special Electronics Mission Aircraft, and the joint development with the Navy of the AN/ALQ-162 Continuous Wave Radar Jammer. Joint development (Army/Navy) of the AAR-46 Passive Missile Detector will be initiated. Testing and software/threat update for the AN/APR-39(V)2 Radar Warning Receiver will be completed.

3. (U) FY 1982 Planned Program: This year's program includes the production validation testing and software 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. Programs continue for AN/ALQ-156 (basic for Special Electronic Mission Aircraft), the Army's portion of the joint engineering development programs with the Navy for the ALQ-162 Continuous Wave Radar Jammer and AAR-46 Passive Missile Detector. This program also 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 Radio Frequency Memory (DRFM) developments.

4. (U) FY 1983 Planned Program: This program will continue/complete development of the AN/ALQ-156 (Fixed Wing) Missile Detector, the AN/AAR Ultraviolet Missile Detector, Digital Radio Frequency Memory (DRFM) for the AN/ALQ-136 Radar Jammer, test of Monopulse Countermeasures, and Airborne Self-Protector Radar Jammer (ASPJ) for Special Electronic Mission Aircraft. The Airborne Self-Protection Jammer is a Tri-Service Program. An Engineering Development program will be initiated for millimeter wave length chaff expendables for use in the M-130 dispenser.

5. (U) Program to Completion: The major efforts will continue/complete the joint Army/Navy AAR-46 Passive Missile detector, the ALQ-156 (basic for special electronic mission aircraft) Missile Detector, and the Army's portion of the joint

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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-1 Budget Activity: #4 - Tactical Programs

service development of (monopulse) expendables, Advanced Self-Protection Radar Jammer (ASPJ), and Digital Radio Frequency Memory (DRFM). Modifications to the fielded family of infrared suppressors, Radar Warning Receivers, jammers, expendable munitions and radio frequency countermeasures will be developed and tested as new threats dictate. Developments will be transferred from advanced development Project D653, Special Electronics Mission Aircraft Equipment, to countermeasures against threat weapons constantly being reviewed and updated. 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):

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	3718	4877	9123	12779	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	6778	5225	13994	-	Continuing	Not Applicable
Aircraft Procurement, Army						
Funds (current requirements)	33104	21210	40734	34728	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	45169	25848	34435	-	Continuing	Not Applicable
Quantities (current requirements)					Continuing	Not Applicable
Quantities (as shown in FY 1981 submission)					Continuing	Not Applicable

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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 Budget Activity: #4 - Tactical Programs

As there are approximately fifteen different pieces of aircraft survivability equipment in this program element, rolling them up into a total quantity is rather meaningless. RDTE for FY80: decrease due to deletion of a \$3 million task for the SEMA version of the AN/ALQ-136 against the airborne intercept threat. The \$3 million dollars was used for a higher priority Army program. FY81 decrease attributable to the application of general Congressional reductions. FY82 decrease of \$4.87M was made for other higher priority Army programs. This program is closely coordinated with aircraft procurement funding. Quantity/funding by year variations reflect changes in aircraft survivability equipment (ASE) applications to varying requirements in aircraft production/modification schedules.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.12.A

Title: USA Tactical Command, Control, and Communications Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #6 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3984	10692	9197	19978	Continuing	Not Applicable
D323	System Engineering for Tactical C3 Systems	3984	8864	7005	14789	Continuing	Not Applicable
D324	USA/NATO Tactical C3 Systems Interoperability	0	1824	2192	5189	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Tactical commanders have a requirement to know of the battlefield situation on a continuing near-realtime basis. To satisfy this requirement, a large amount of data from a variety of sources must be received, processed, correlated, and displayed. This process demands that tactical automated systems have the capability to readily exchange information. The programs contained herein 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. Project D323 will increase the operational effectiveness of the Army's battlefield automated systems through interoperability. A systems approach to automation interoperability engineering will be accomplished in several phases: 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). Project D324 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.

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Program Element: #6,47.12.A

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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.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: During FY82, the majority of project D323 efforts will be devoted to the completion of the system, subsystems, and interface specifications needed to technically define the deployment of the Army's tactical command, control, and communications (C3) system. Interface development management activities will also be pursued. These activities will include the definition of the terminal interface requirements for the interfaces among the control and subordinate systems of the command and control architecture, definition of interface design, and establishment of the test programs needed to verify the selected interface design. The major activities of the project can be summarized as follows: Interface definition for future Position Location Reporting System/Joint Tactical Information Distribution System (PLRS/JTIDS) Hybrid applications and assessment of electronic warfare vulnerability will be performed. Engineering analysis will be done to obtain worldwide approval of frequency allocations for peacetime and wartime applications of Army communications/electronics equipment in development and procurement. System engineering analysis and support efforts will be accomplished to assure interoperability among Communications Research and Development Command (CORADCOM) items and to resolve developmental problems. The Army Command Control System (ACCS) System Engineer shall assure satisfaction of established technical interface requirements, agreed interface design plans and interface specifications. Interface designs will be validated/verified through a coordinated test program. Project D324 efforts include the completion of the technical interface design plans and associated interface specifications for US Army Tactical Computer System/Tactical Computer Terminal (TCS/TCT) interoperability with the German and British equivalent systems (Heros and Havell). Efforts will also be pursued to establish a test program for demonstrating USA Tactical Fire Direction System (TACFIRE) compatibility and interoperability with the German and British equivalent systems (ADLER and BATES). Work will also be devoted to the development, coordination, presentation, and defense of US Army technical positions concerning proposed interoperability standards for NATO national tactical data systems, combat net radio systems, and tactical switched systems.

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1980 Submission</u>
a.(u) Publish first edition of Army Command and Control System (ACCS) Materiel Development Plan	FY81	None Shown

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Program Element: #6.47.12.A

Title: USA Tactical Command, Control, and Communications
Systems Engineering

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
b.(4) Establish ACCS Configuration Control Board	FY81	None Shown
c.(4) Complete System Definition and Definition of Network Management and Systems Control Solutions for PLRS/JTIDS Hybrid	FY81	None Shown
d.(4) Complete Jamming Vulnerability Assessment for PLRS/JTIDS Hybrid	FY81	None Shown
e.(4) Complete Baseline and Objective Portions of ACCS Specifications	FY82	None Shown
f.(4) Complete Software Development for EMC Analysis for Army Frequency Engineering	FY83	None Shown
g.(4) Complete PLRS/JTIDS Hybrid Spoofing Vulnerability Assessment	FY82	None Shown
h.(4) Complete Transition Phase I Portions of Army Command and Control System (ACCS) Functional Segment Specifications	FY83	None Shown
i.(4) Complete PLRS/JTIDS Hybrid System Feasibility Analysis	FY84	None Shown
j.(4) Begin Configuration Management (NATO TDS)	FY81	FY81
k.(4) Prepare Testbed Modifications (NATO TDS)	FY82	FY82

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Program Element: #6.47.12.A

Title: USA Tactical Command, Control, and Communications
Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

No major milestones have changed. Milestones as presented this year reflect consolidation of the steps involved for the development of an interface standard as shown last year, and reflect a more major overview of the program as structured under the Army Command and Control Master Plan (AC2MP).

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	3984	10692	9197	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4984	11928	19073	Continuing	Not Applicable

FY80 decrease reflects reprogramming action by the Army. FY81 decrease attributable to the application of general Congressional reductions. Decrease in FY82 results from redistribution of funds during the Army prioritization process.

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

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Program Element: #6.47.12.A

Title: USA Tactical Command, Control, and Communications
Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of Project 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 Project 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 strengthening 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 Congressional mandate, so as to maximize the operational effectiveness of combined NATO National tactical forces deployment. Both the system engineering plan and the interoperability plan will be integrated 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:

(U) This program is related to the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program (6.47.79.A). JINTACCS efforts drive towards joint interoperability (interoperability across service lines), while this program moves towards Army intraoperability (interoperability within the Army), thus complementing JINTACCS by building on their standards to cover Army-unique requirements.

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Program Element: #6.47.12.A

Title: USA Tactical Command, Control, and Communications
Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

(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 these projects. This plan provides the necessary guidance to Army agencies to preclude duplication of effort.

H. (U) WORK PERFORMED BY: 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.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Project D324 was not funded until FY81. Project D323 was first funded in FY80 and the following was accomplished:

(U) The completion of the development plan for Command, Control, and Communications (C3) specifications, and the initiation of key portions of the top-level and functional system interface specifications were accomplished during this period. Significant progress was made on the five related tasks as outlined below:

(U) Completed development plan for C3 specifications; initiated functional system interface specifications for Tactical Computer Terminal--Battlefield Exploitation and Target Acquisition (TCT-BETA) and Tactical Fire Direction System--Multiple Launch Rocket System (TACFIRE-MLRS).

(U) Completed initial program plan; reviewed proposed system specifications and defined interface functions.

(U) Provided analyses for 40 Army combat systems and 50 Army noncombat systems; engineering review of other service and non-DOD government agencies analyses to assure minimum impact on Army frequency spectrum use.

(U) Developed Army position for data transfer protocols; developed proposal for NATO near-term data system interface and technical solution for Decentralized Automated Service Support System (DASS) Communications Facility.

(U) Developed Battlefield Interoperability Implementation Plan (BIIP) and obtained support for development of C3 systems engineering management plan.

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Program Element: #6.47.12.A

Title: USA Tactical Command, Control, and Communications Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

2. (U) FY 1981 Program:

a. (U) For Project D123: During FY81, the prime project effort emphasis will be devoted to completing drafts of the Baseline and Objectives portions of the Command, Control, and Communications Systems Specifications and the preparation of selected Interface Specifications. Specific task objectives are the: preparation of the Tactical Fire Direction System (TACFIRE) interfaces specifications, definition of the Position Location Reporting System/Joint Tactical Information Distribution System (PLRS/JTIDS) system interface, completion of the frequency spectrum assessment, and the updating of the system engineering plan.

b. (U) For Project D124: NATO conferences/meetings will be attended to include the Allied Tactical Data Systems Interoperability Agency Military Command, Control and Information Systems Working Group and STANAGS Subgroups to discuss and plan for interoperability of various systems (specifically TACFIRE and British and German equivalent systems). Additionally, Communications Research and Development Command (CORADCOM), will specify those systems and interfacing requirements effected in order that concept formulation of design interface requirements may begin in FY 81. The basis for these design requirements is being derived from Army participation in the USA/NATO Command, Control and Communications committees and the Joint Interoperability of Tactical Command and Control Systems (JINTACCS Army) Program. For those Army systems identified, Technical 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 interoperability requirements.

3. (U) FY 1982 Planned Program:

a. (U) For Project D123: During FY82, the majority of the project will be devoted to the completion of the system, subsystem, and interface specifications needed to technically define the Phase I deployment of the Army's C3 systems. Major activities are summarized as follows: Interface definition for future Position Location Reporting System/Joint Tactical Information Distribution System (PLRS/JTIDS) Hybrid applications and assessment of EW vulnerability will be performed. Engineering analysis will be done to obtain worldwide approval of frequency allocations for peacetime and wartime applications of Army communications/electronics equipments in development and procurement. System engineering analysis and support efforts will be accomplished to assure interoperability among CORADCOM items and to resolve developmental problems. Interface facilities will be developed to achieve interoperability among subordinate systems and control elements of each

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Program Element: #6.47.12.A

Title: USA Tactical Command, Control, and Communications
Systems Engineering

DOD Mission Area: 0254 - Tactical Command and Control

Budget Activity: 34 - Tactical Programs

functional segment of the Army's Tactical Command, Control Subordinate System (CCS2) architecture. The Army Command Control System (ACCS) System Engineer shall assure satisfaction of established technical interface requirements, agreed interface design plans and interface specifications. Interface designs will be validated/verified through a coordinated test program.

b. (U) For Project D124: Those Army systems which are planned to be interfaced with the various NATO G3 tactical data systems include the following: US Army Tactical Fire Direction System (TACFIRE) with its British and German equivalents, Missile Minder (AN/TSQ-71) with its German equivalent, and the tactical operational center automated system for Corps and the supporting elements with its British and German equivalents. Technical Interface Design Plan development will commence, and compatibility and interoperability (C&I) test planning for these system interfaces will continue throughout FY82. Configuration Management planning will continue, and preparation will begin for modifications to the Army interoperability testbed.

4. (U) FY 1983 Planned Program: FY83 efforts for D121 will be as follows:

(U) Assess the testing and supporting analysis/simulation efforts for the Position Location Reporting System/Joint Tactical Information Distribution System (PLRS/JTIDS) Hybrid to develop a conclusion with respect to the feasibility of the PLRS system. Continue Army frequency engineering efforts shown for FY82, and continue systems engineering analyses and support efforts to assure interoperability among the Communications Research and Development Command (CORADCOM) items. For D124: Interoperability tests for TACFIRE with British and German equivalents will be evaluated; scope of the interoperability test program will be expanded, and work on NATO-wide interoperability standards for data systems will be continued.

5. (U) Program to Completion: This is a continuing program. The resultant set of specifications will, under a formal configuration control process, be updated as necessary to reflect changes in user needs and doctrine. It is anticipated that new automated command, control and communication system elements will be introduced and those in the field will be changed/updated. Therefore there will be a continuing need for configuration management for developmental and operational systems. The USA/NATO 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

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Program Element: #6.47.12.A

Title: USA Tactical Command, Control, and Communications
Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

extent possible. Full-scale interoperability testing between US, German, and British 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 interoperability 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 Joint Interoperability of Tactical Command and Control Systems (JINTACCS) (6.47.79.A) Program will be maintained.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D123

Title: Systems Engineering for Army Tactical Command, Control, and Communications (C3) Systems

Program Element: #6.47.12.A

Title: USA Tactical C3 Systems Engineering

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 the 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 Administration/Logistics, 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: This program is related to the Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program (6.47.79.A). JINTACCS efforts drive towards joint interoperability (interoperability across service lines) while this program moves towards Army intraoperability (interoperability within the Army), thus complementing JINTACCS by building on their standards to cover Army-unique requirements. 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 these programs. This plan provides the necessary guidance to Army agencies to preclude 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.

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Project: #D323

Title: Systems Engineering for Army Tactical Command, Control, and Communications (C3) Systems

Program Element: #6.47.12.A

Title: USA Tactical C3 Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: The completion of the development plan for C3 Specifications and the initiation of key portions of the top-level and functional system interface specifications were accomplished during this period. Significant progress was made on the five related tasks as outlined below:

a. (U) Completed development plan for C3 specifications; initiated functional system interface specifications for Tactical Computer Terminal - Battlefield Exploitation and Target Acquisition (TCT-BETA) and Tactical Fire Direction System - Multiple Launch Rocket System (TACFIRE-MLRS).

b. (U) Completed initial program plan; reviewed proposed system specification and defined interface functions.

c. (U) Provided analyses for 40 Army combat systems and 50 Army noncombat systems; engineering review of other service and non-DOD government agencies analyses to assure minimum impact on Army frequency spectrum use.

d. (U) Developed Army position for data transfer protocols; developed proposal for NATO near-term data system interface and technical solution for Decentralized Automated Service Support System (DAS3) Communications Facility.

e. (U) Developed Battlefield Interoperability Implementation Plan (BIIP) and obtained support for development of C3 systems engineering management plan.

2. (U) FY 1981 Program: The prime project effort emphasis will be devoted to completing drafts of the Baseline and Objectives portions of C3 systems specifications and the preparation of selected interface specifications. Specific task objectives are the: preparation of the TACFIRE interface specifications, definition of the Position Location Reporting System/Joint Tactical Information Distribution System (PLRS/JTIDS) Hybrid Interface, completion of the frequency spectrum assessment, and the updating of the system engineering plan.

3. (U) FY 1982 Planned Program: The majority of the project will be devoted to the completion of the system, subsystem, and interface specifications needed to technically define the phase I deployment of the Army's C3 systems. Major ac-

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Project: #D323

Title: Systems Engineering for Army Tactical Command, Control, and Communications (C3) Systems

Program Element: #6.47.12.A

Title: USA Tactical C3 Systems Engineering

DOD Mission Area: #154 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

tivities are summarized as follows: Interface definition for future PLRS/JTIDS Hybrid (PJH) applications and assessment of EW vulnerability will be performed. Engineering analysis will be done to obtain worldwide approval of frequency allocations for peacetime and wartime applications of Army communications/electronics equipment in development and procurement. System engineering analysis and support efforts will be accomplished to assure interoperability among CORADCOM items and to resolve developmental problems. Interface facilities will be developed to achieve interoperability among subordinate systems and control elements of each functional segment of the Army's Tactical Command, Control Subordinate System (CCS2) architecture. The Army Command Control System (ACCS) System Engineer shall assure satisfaction of established technical interface requirements, agreed interface design plans, and interface specifications. Interface designs will be validated/verified through a coordinated test program.

4. (U) FY 1983 Planned Program: Efforts will be as follows: Assess the testing and supporting analysis/simulation efforts for the PLRS JTIDS Hybrid (PJH) to develop a conclusion with respect to the feasibility of the PJH system. Continue Army frequency engineering efforts shown for FY82 and continue systems engineering analyses and support efforts to assure interoperability among CORADCOM items.

5. (U) Program to Completion: This is a continuing program. The resultant set of specifications will, under a formal configuration control process, be updated as necessary to reflect changes in user needs and doctrine. It is anticipated that new automated command, control, and communication system elements will be introduced and those in the field will be changed/updated. Therefore there will be a continuing need for configuration management for developmental and operational systems. Full allied and NATO coordination will be maintained.

6. (U) Major Milestones:

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Project: #0323

Title: Systems Engineering for Army Tactical Command, Control, and Communications (C3) Systems

Program Element: #6.47.12.A

Title: USA Tactical C3 Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
a.(u) Publish First Edition of Army Command and Control Systems (ACCS) Materiel Development Plan	FY81	NOT SHOWN
b.(u) Establish ACCS Configuration Control Board	FY81	NOT SHOWN
c.(u) Complete System Definition and Definition of Network Management and Systems Control Solutions for PLRS/JTIDS Hybrid	FY81	NOT SHOWN
d.(u) Complete Jamming Vulnerability Assessment for PLRS/JTIDS Hybrid	FY81	NOT SHOWN
e.(u) Complete Baseline and Objective Portions of Army Command and Control Systems Specifications, all levels	FY82	NOT SHOWN
f.(u) Complete Software Development for Electromagnetic Compatibility (EMC) Analysis for Army Frequency Engineering	FY83	NOT SHOWN
g.(u) Complete PLRS/JTIDS Hybrid Spoofing Vulnerability Assessment	FY82	NOT SHOWN
h.(u) Complete Transition Phase I Portions	FY83	NOT SHOWN

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Project: #D323

Title: Systems Engineering for Army Tactical Command, Control, and Communications (C3) Systems

Program Element: #6.47.12.A

Title: USA Tactical C3 Systems Engineering

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
of ACOS Functional Segment Specifications		
1.0 Complete PLRS/JTIDS Hybrid System Feasibility Analysis	FY84	NOT SHOWN

No major milestones have changed. Milestones as presented this year reflect consolidation of the steps involved for the development of an interface standard as shown last year, and reflect a more major overview of the program as structured under the Army Command and Control Master Plan (AC2MP).

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	3984	8864	7005	14789	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4984	9965	14109	-	Continuing	Not Applicable

The FY80 decrease is due to Army reprogramming of funds to higher priority Army requirements. The decrease in FY81 is attributable to the application of general Congressional reductions. Decrease in FY82 results from redistribution of funds during the Army prioritization process.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.13.A

DOD Mission Area: #216 - Land Combat Service Support

Title: Combat Feeding, Clothing, and Equipment

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	4613	2368	3593	4207	Continuing	Not Applicable
DL40	Clothing and Equipment	1599	998	2617	3404	Continuing	Not Applicable
DL47	Wholesomeness Testing of Irradiated Foods	2514	0	0	0	0	Not Applicable
D548	Military Subsistence System	500	1370	976	803	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Success on the battlefield depends upon 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, ballistic, and camouflage protection. It 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; 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 Department of Defense (DOD) Food Research, Development, Testing, and Engineering (RDT&Eng) Program managed by the Army as Executive Agent for all the military services and the Defense Logistics Agency (DLA).

C. (U) BASIS FOR FY 1982 RDTE REQUEST: This program provides for the introduction of new protection capabilities as well as the correction of known deficiencies in items of individual clothing and equipment, and allows the completion of Engineering Development (ED) 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,

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Program Element: #6.47.13.A

DOD Mission Area: 7216 - Land Combat Service Support

Title: Combat Feeding, Clothing, and Equipment
Budget Activity: 76 Tactical Programs

and combat. The work to be performed under this request allows for exploitation of methods, materials, and capabilities developed under related basic research programs and deemed suitable for Engineering Development prior to adoption as Standard.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4613	2368	3593	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4526	2543	3463	Continuing	Not Applicable

(U) The net increase in FY 1980 funding results from the combined effects of:

(U) DL40 - An increase in funding to accelerate development by approximately one year of a ground combat vehicle crewman's uniform ensemble. This clothing is designed to provide an integrated system to specifically protect the crewman against a broad spectrum of environmental, occupational, and battlefield hazards.

(U) DL47 - A modest increase in funding was provided to facilitate transfer of files and reports of this program to the US Department of Agriculture. Funding for this program terminated in FY 1980 due to transfer of wholesomeness testing of irradiated foods to the US Department of Agriculture.

(U) D548 - Decrease in FY 1980 funds resulted from reprogramming efforts to permit response to a high-priority military service requirement for Food advanced development program, D610 - Food Advanced Development.

(U) The overall decrease of \$175 thousand in the FY 1981 funding level for this PE reflects the application of general Congressional reductions.

(U) The overall increase in FY 1982 funds for this PE is the result of refined cost estimates as well as application of higher inflation, civilian pay, and fuel pricing indices than were applied last year.

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

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

Title: Combat Feeding, Clothing, and Equipment
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 the soldier's combat efficiency and survivability on the battlefield. It includes the Engineering Development (ED) 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, 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 military 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 Technology; PE 6.37.47.A, Soldier Support/Survivability, Project D669, Clothing and Equipment. Work in food is conducted in PE 6.11.02.A, Support of Equipment for the Individual Soldier, Project AH52, Research in Support Equipment of Individual Soldier; in PE 27.24.A, Joint Services Food Systems Technology, Project AH99, Food Technology; and in PE 6.37.47.A, Soldier Support/Survivability, Project D619, Food Advanced Development.

H. (U) WORK PERFORMED BY: The US Army Natick Research and Development Laboratories, Natick, MA, perform 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; US Army Research Institute of Environmental Medicine, Natick, MA, and US Department of Agriculture, Stored Products Laboratory, Savannah, GA. Current contractors include RO-Search, Inc., Waynesville, NC; Brunswick Corp., Willard, OH; Camel Manufacturing, Knoxville, TN; and Tennessee Apparel, Talahoma, TN.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) PY 1980 and Prior Accomplishments: Type classified Phase I of the Combat Vehicle Crewman (CVC) clothing system (NOMEX (Flame Retardant) coveralls; cold weather jacket; summer gloves; winter gloves). Conducted Development Acceptance In-Process Review (DEVA IPR) for the following items for CVC, Phase II: body armor, fragmentation protective liner, coverall; overall with insulated lining; balaclava (knitted head/facemask); combat boot; insulated combat boot; modified DH-132 helmet. An additional size of both the Personnel Armor System for Ground Troops (PASGT) helmet and vest was added to accommodate the female soldier. Type classified both the temperate and desert portions of the battledress (camouflaged)

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Program Element: #6.47.11.A
DOD Mission Area: #216 - Land Combat Service Support

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

uniform system. Completed a short-term, high-priority effort on Firefly (Luminescent Nighttime Individual Identification device). Initiated Engineering Development (ED) on body armor for Explosive Ordnance Disposal (EOD) personnel, and petroleum handlers' gloves for extreme cold weather. Initiated development of a nonshinable boot for ground soldiers which will provide a great increase in water resistance, toe protection, and improved traction. Completed development of United States Marine Corps field refrigeration equipment. Evaluated foreign and domestic food service equipment for potential in field, garrison, and hospital food service system applications. The mobile field kitchen was adopted as Army standard and is now being issued to Army units replacing the World War II vintage M45 tent kitchen. Initiated development of New modular tentage system to replace all General Purpose (GP) tentage and most special purpose tentage (Tent, Extendable, Modular, Personnel-TEMPER).

2. (U) FY 1981 Program: Conduct tropic test of the temperate portion of the Battledress Uniform, and type classify for use in tropic zones. Type classify Combat Vehicle Crewman (CVC), Phase II, to complete the CVC program, with the exception of the face mask. Additional development effort will be conducted on the face mask to resolve deficiencies which occurred in the Development Testing II/Operational Testing II (DT II/OT II). DT II/OT II will be conducted on infantry combat boot and fuel handlers' gloves. Initiate effort on the insulated canteen and extreme cold weather flyers' gloves. Evaluate foreign and commercial food service equipment for military services in garrison. Initiate Engineering Development (ED) of Army automated field bakery system. Continue insect-resistance testing of protective packaging material for incorporation in the procurement of the new meal-ready-to-eat (MRE) individual combat ration. Procure prototype TEMPER tents for conduct of Development Testing II/Operational Testing II (DT II/OT II) testing.

3. (U) FY 1982 Planned Program: Type classify Combat Vehicle Crewman (CVC) face mask, fuel handwear, and combat boot. Conduct DT II/OT II on the insulated canteen, extreme cold weather flyers' gloves, and ballistic Explosive Ordnance Disposal (EOD) suit. Initiate effort on microclimate crew protective system for vehicle crewmen; CVC artillery helmet; 12.7mm protective armor for aircrews. Initiate Engineering Development (ED) on a noise protective communications headset to be compatible with the new ground soldier combat helmet. Continue ED of Army automated field bakery system and hold Development Acceptance 'n-Process Review (DEVA IPR) for type classification. Initiate ED on US Marine Corps containerized galley for rapid deployment force on Merchant Marine container ships. Continue evaluation of selected domestic and foreign food service equipment for potential use in garrison and/or field food service systems. Continue insect-resistance testing of MRE package. Conduct DT II/OT II for TEMPER tent. Initiate ED of Transportable Helicopter Enclosure (THE). Initiate ED of new field space heater.

4. FY 1983 Planned Program: Type classify the insulated canteen and extreme cold weather flyers' gloves. Initiate development of: Aircrew Survival/Aircrew Recovery Vest; lightweight body armor for ground soldiers; ladder-weave cold weather underwear. Initiate Development Testing II/Operational Testing II (DT II/OT II) for CVC helmet and microclimatic crew pro-

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Program Element: #6.47.13.A

Title: Combat Feeding, Clothing, and Equipment

DOD Mission Area: #216 - Land Combat Service Support

Budget Activity: #4 - Tactical Programs

tection system. Complete DT II/OT II and type classify body armor for Explosive Ordnance Disposal (EOD) personnel. Continue ED on noise protective communications headset for Infantry helmet. Continue ED on USMC containerized galley. Complete Engineering Development (ED) on modular tentage, infantry combat boot, and automated bakery system. Continue evaluation of domestic and foreign food service equipment for possible Services application.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.14.A

DOD Mission Area: #216 - Land Combat Service Support

Title: Tactical Electric Power Sources

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	4400	3322	2172	4636	Continuing	Not Applicable Not Applicable
D194	Engine-Driven Generators	100	452	609	375	Continuing	Not Applicable
D196	Silent Power Generating Sources	4300	2870	1563	4261	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. Improvements in the tactical suitability of power generation equipment include increased mobility resulting from weight and size reduction, and advanced battlefield survivability from reductions in generator set noise levels and heat signatures. Because of the pervasiveness of tactical generator sets on the modern battlefield, these improvements have direct impact on the combat effectiveness and survivability of such key systems as command, control and communications. Important logistical improvements include reduction in fuel consumption, providing a nonfossil fuel/multifuel capability, increasing the commonality of components and standardization to reduce the number of different types of generators.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Funding is required to continue the development of the 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:

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Program Element: PL 47.14.A

Title: Tactical Electric Power Sources

DOD Mission Area: \$216 - Land Combat Service Support

Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Complete test model design/fabrication	4th Qtr FY 1981	4th Qtr FY 1981
Complete development and operational tests	3rd Qtr FY 1983	2nd Qtr FY 1983
Development acceptance in-process review	2nd Qtr FY 1984	3d Qtr FY 1983

The one-quarter delay of the expected completion of the development and operational test phase has been caused by the time required to resolve a protest of the contract awarded for this effort. The date for the development acceptance in-process review has been revised based on a more precise analysis of the time required for the development process activities.

D. (U) COMPARISON WITH FY 1981 ROTE REQUEST (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
ROTE					
Funds (current requirements)	4400	3322	2172	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	5095	3938	6056	Continuing	Not Applicable

(a) D194 - \$650 thousand in FY 1980 funds planned for efforts on silencing of the 10 kilowatt (kW) Gas Turbine Engine Driven Generator Set were reprogramed to higher priority Army requirements. The decrease of \$404 thousand in the FY 1981 funding level is the combined result of providing \$363 thousand as an internal offset in the FY 1981 Budget Amendment and a decrease of \$41 thousand reflecting the application of general Congressional reductions. A reduction of \$2442 thousand in FY 1982 funds is a result of refined program estimates and scope of effort with respect to gas turbine generators.

(a) D196 - A \$45 thousand reduction in FY 1980 reflects lower actual-project costs than previously estimated. A decrease of \$212 thousand in FY 1981 funding level reflects the application of general Congressional reductions. A reduction of \$1442 thousand in FY 1982 funds reflects deferrals of the start of full-scale development of the 3kW methanol fuel cell due to delay in completing prerequisite Advanced Development.

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Program Element: #6.47.14.A

Title: Tactical Electric Power Sources

DDO Mission Area: 2216 - Land Combat Service Support

Budget Activity: #4 - Tactical Programs

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

Development of the 10 kW 60 Hertz (Hz) Gas Turbine Generator Set is complete. No procurement funds have been requested because the unit cost makes it unlikely that this set will be used by the Army in a general purpose role. It remains a candidate for unique tactical applications where its lesser weight and size and/or multifuel capability are absolutely essential. A detailed review of Army power generation requirements to identify any such applications is now in progress. Technological breakthroughs achieved in the development of the 10 kW 60 Hz turbine generator set have speeded the development and fielding of other turbine power generators such as the 10 kW 400 Hz generator set (now in production) which provides lightweight mobile electric power for the Firefinder mortar-locating radar system.

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Program Element: #6.47.14.A

DOD Mission Area: #216 - Land Combat Service Support

Title: Tactical Electric Power Sources

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 efficient, quieter, longer in life, higher in reliability, and with lower 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. The existing primary contractor is United Technologies Corporation (UTC) of South Windsor, CT.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: A contract for the fabrication of the 1.5 kW methanol fuel cell member of the Silent Lightweight Electric Energy Plant family was awarded. Phase I design and analysis and component development and testing are nearly completed. The unit cost of the 10 kW turbine necessitated review of Army requirements for this lightweight generator set. Consequently, the scheduled development acceptance review of the 10 kW 60 Hz Gas Turbine generator set was not completed in FY82.

2. (U) FY 1981 Program. Full-scale development of the 1.5 kW methanol fuel cell power plant will be continued and contractor preliminary qualification testing of the Phase II prototypes will be initiated. The development acceptance review of the 10 kW 60 Hz Gas Turbine Engine Driven Generator Set will be completed.

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

Title: Tactical Electric Power Sources
Budget Activity: 14 - Tactical Programs

3. (U) FY 1982 Planned Program: Contractor preliminary Qualification Testing will continue coincidental with the fabrication of additional prototype 1.5 kW methanol fuel cell electric power units to be used for subsequent development and operational testing. Fabrication is scheduled to be completed for the 10 kW silenced gas turbine generator.

4. (U) FY 1983 Planned Program: Development and operational testing (DT II and OT II) for the 1.5 kW methanol fuel cell will be conducted. DT II and OT II are also scheduled for the silenced 10 kW 60 Hz generator set.

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

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	6903	11350	12231	14531	Continuing	Not Applicable
DH01	Combat Engineer Equipment	844	810	5155	9309	Continuing	Not Applicable
DH14	Container Distribution Equipment	0	0	0	0	Continuing	Not Applicable
DL17	Camouflage	0	0	0	0	Continuing	Not Applicable
DL39	General Support Equipment	3164	2265	3221	2545	Continuing	Not Applicable
DL41	Fuels Handling Equipment Systems	0	1458	0	0	Continuing	Not Applicable
D429	Tactical Rigid-Wall Shelters	2137	5923	2691	1381	Continuing	Not Applicable
D832	Combat Medical Materiel	758	894	1164	1296	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. Fuel, ammunition, food, and medical supplies must be delivered to field units quickly and in the required quantities. Hardened shelters are required to preserve communications, command, and control capabilities in either a nuclear or nonnuclear 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. A new family of tactical bridging will improve capabilities for crossing rivers and natural barriers. New water purification equipment will insure adequate supplies of potable water from any source. Equipment capable of off-loading, transporting, and handling containerized cargo and bulk fuels is required. A new family of multiuse standard tactical shelters, hardened against nuclear, ballistic, and chemical/biological threats is required to protect sophisticated electronic equipment and operating personnel. New and more efficient environmental control equipment (heating/air-conditioning) is required. New and improved field casualty treatment systems are vital to maintaining combat effectiveness.

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

C. (U) BASIS FOR FY 1982 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; 15,000, 60,000 and 250,000 British Thermal Unit per Hour (BTUH) multifuel heaters; 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) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	6903	11350	12231	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	5636	12229	13961	Continuing	Not Applicable

The net increase in FY 1980 funding reflects the combined effects of the following:

- (U) DH01 - An increase in the costs for testing the Ribbon Bridge Erection Boat and the Military Amphibious Reconnaissance Boat.
- (U) DH14 - Deferral of the planned effort due to delay in completing prerequisite Advanced Development programs.
- (U) DL17 - Deferral of planned effort due to lack of approved user requirements documentation.
- (U) DL39 - Acceleration of the 3000/2000 gallon per hour Reverse Osmosis Water Purification Unit development program to provide an essential capability to supply potable water to deployed forces.
- (U) D429 - Acceleration of the hardened S250 and S280 shelter program and development of the 20-foot nonexpandable and

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Program Element: #6.47.17.A

Title: General Combat Support

DOD Mission Area: #216 - Land Combat Service Support

Budget Activity: #4 - Tactical Programs

two-side expandable shelters to provide protection of critical systems and operating personnel against nuclear, ballistic and chemical/biological threats.

The decrease of \$879 thousand in FY 1981 reflects the application of general Congressional reductions.

(U)DL41 - Plans are to reprogram all FY 1981 funds to other high-priority Army programs due to delays in accomplishing required prerequisite Advanced Development and the lack of approved user requirements documentation.

The net decrease in the FY 1982 funding requirement results from the following:

(U)DH01 - Resolution of technical problems identified during feasibility testing required advancing the state-of-the-art in tactical bridging and delayed completion of the Advanced Development effort. The additional FY 1982 funds are required to accelerate Engineering Development to realign the US program with the trilateral (US-UK-GE) coordinated schedule.

(U)DL39 - Increased funding is required to support the 3000/2000 gallon per hour Reverse Osmosis Water Purification Unit program acceleration initiated in FY 1981.

(U)DL41 - Deferral of all planned effort to fund other higher priority Army programs.

(U)D429 - The FY 1982 funding requirement is reduced due to projected delay of contract award until FY 1983 for fabrication of a prototype 20-foot nonexpandable shelter.

(U)D461 - Termination of all planned effort in response to prior Congressional direction to eliminate Army ROTE efforts on watercraft.

(U)D832 - Increased costs shown in FY 1982 and beyond are the result of higher fuel, inflation, and civilian pay pricing indices than were applied last year.

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

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Program Element: #6.47.17.A

Title: General Combat Support

DOD Mission Area: #216 - Land Combat Service Support

Budget Activity: #4 - Tactical Programs

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Other Procurement, Army						
Ribbon Bridge Erection Boat:						
Funds (current requirements)	0	8500 ^{1/}	13700 ^{1/}	-	31236 ^{3/}	86036 ^{3/}
Funds (as shown in FY 1981 submission)	0	8300	13300	-	45152	79752
Quantities (current requirements)	0	100 ^{1/}	100 ^{2/}	-	228 ^{3/}	628 ^{3/}
Quantities (as shown in FY 1981 submission)	0	100	150	-	544	994
Water Purification Unit 600 gal/hr						
Funds (current requirements)	2500		1200	0	0 ^{4/}	0
Funds (as shown in FY 1981 submission)	1900		0	-	1381	8581
Quantities (current requirements)	11	0	7	0	0 ^{4/}	48 ^{4/}
Quantities (as shown in FY 1981 submission)	11	0	0		8	49
Water Purification Unit 3000 gal/hr						
Funds (current requirements)	0	0	0	9500	87780	97280
Funds (as shown in FY 1981 submission)	0	0	0	-	-	-
Quantities (current requirements)	0	0	0	75	693	768
Quantities (as shown in FY 1981 submission)						

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Program Element: #6.47.17.A

Title: General Combat Support

DOD Mission Area: #216 - Land Combat Service Support

Budget Activity: #4 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
submission)	0	0	0	-	-	-
Multifuel Heater, 250,000 BTUH						
Funds (current requirements)	-	-	-	3000	66028	69028
Funds (as shown in FY 1981						
submission)	-	-	-	-	-	-
Quantities (current requirements)	-	-	-	670	14747	15417
Quantities (as shown in FY 1981						
submission)	-	-	-	-	-	-
HI-Speed Mini-Sterilizer						
Funds (current requirements)	-	-	-	2300	5/	5/
Funds (as shown in FY 1981						
submission)	-	-	-	-	-	-
Quantities (current requirements)	-	-	-	742	5/	5/
Quantities (as shown in FY 1981						
submission)	-	-	-	-	-	-
High Capacity Radiograph System						
Funds (current requirements)	-	-	8300	2700	5/	5/
Funds (as shown in FY 1981						
submission)	-	-	-	-	-	-
Quantities (current requirements)	-	-	150	50	5/	5/
Quantities (as shown in FY 1981						
submission)	-	-	-	-	-	-

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Program Element: #6.47.17.A

Title: General Combat Support

DOD Mission Area: #216 - Land Combat Service Support

Budget Activity: #4 - Tactical Programs

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Low-Capacity Radiograph System						
Funds (current requirements)	-	-	-	10360	5/	5/
Funds (as shown in FY 1981 submission)	-	-	-	-	-	-
Quantities (current requirements)	-	-	-	864	5/	5/
Quantities (as shown in FY 1981 submission)	-	-	-	-	-	-

1/ (u) The FY 1981 and FY 1982 increases in funds account for inflation. The FY 1981 quantity has not yet been reduced to reflect higher than expected actual unit costs.

2/ (u) The FY 1982 unit cost estimate is accurate, and the quantity has been reduced to reflect the latest contract award pricing.

3/ (u) The reduction in quantities is based on revised requirements. The net effects of the reduced quantity requirements and the increase in unit cost results in a reduction in funds for "Additional to Completion" and increased "Total Estimated Cost."

4/ (u) Reflects revised (reduced) total quantity requirements.

5/ (u) "Additional to Completion" and "Total Estimated Cost" values are not yet available pending validation of total quantity requirements.

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Program Element: 86.47.17.A

Title: General Combat Support

DOD Mission Area: 8216 - Land Combat Service Support

Budget Activity: 84 - 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, countersurveillance, 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); 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, the DOD Executive Agent for Land Based Water Resources, 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 1987 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 contractors include Raytheon Corporation, Bedford, MA; Radian Corporation, Alexandria, VA; Energy Transformation Corporation, Boyertown, PA; Goodyear Aerospace, Litchfield Park, AR; Glickner Mobile Systems, Dallas, TX; Brunswick Corporation, Marion, VA; Craig Systems, Lawrence, MA; Celanese Corporation, Summit, NJ; United Oil Products Inc., (UOP), Los Angeles, CA; Dynamic Sciences Industries, Fairfax, VA; and Seagold Industries, New Brunswick, Canada.

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Program Element: #6.47.17.A

DOD Mission Area: #216 - Land Combat Service Support

Title: General Combat Support

Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Fourteen Military Amphibious Reconnaissance Boats were procured and tested to determine conformance with Joint Army, Navy, and Marine Corps requirements. Engineering Development of the Ribbon Bridge Erection Boat was completed. The United Kingdom Combat Support Boat (UKCSB) was evaluated, found to meet the US Ribbon Bridge Erection Boat requirements and was type classified as US Army Standard. Detailed design of the 3000/2000-gallon-per-hour reverse Osmosis Water Purification Unit (ROWPU) was initiated and the Engineering Development program was restructured to accelerate type classification to meet critical water supply requirements. The 250,000 BTUH multifuel heater design was modified to correct deficiencies identified in development tests. Contractor testing was completed on the one-side expandable tactical shelter (the first of the Army family of standard shelters), and development tests were initiated at two Army test sites. Development of the 20-foot nonexpandable and two-side expandable tactical shelters and nuclear hardening for the S250 and S280 tactical shelters were initiated. The Army Hi-Speed Mini-Sterilizer and battery-operated mosquito light traps were type classified. Deficiencies identified during operational test of the helicopter-slung, solid pesticide-dispersal unit were corrected.

2. (U) FY 1981 Program: Operational testing of the Military Amphibious Reconnaissance Boat will be completed. Engineering Development will be initiated on the 15,000 and 60,000 BTUH multifuel heaters. Development testing of the 250,000 BTUH multifuel space heater will be conducted and operational test will be initiated. Design of the 3000/2000 gallon per hour Reverse Osmosis Water Purification Unit will be completed, three test models will be fabricated, and development tests will be initiated. Engineering Development of the one-side expandable shelter will be completed and the shelter will be type classified. Development of the 20-foot nonexpandable and two-side expandable shelters will continue. Nuclear hardening of the S250 and S280 shelters will be continued. Continuing combat medical materiel development activities will include: Conducting development and operational tests on the helicopter-slung solid and liquid pesticide-dispersal units, the portable field dental operating chair and stool, the high-capacity X-ray system, and the collapsible mosquito light trap; and type classification of the environmental protection containers, the spineboards, the ultra-low-volume aerosol generator, the medical airman's bag, the film processors for low-capacity X-ray units, the portable field dental operating chair and stool unit, and the field combat optometry set.

3. (U) FY 1982 Program: Engineering Development of the Bridging for 1985 and Beyond will be initiated, and a contract awarded for the design and fabrication of the final prototype bridging system. The bridging design effort will incorporate the results of the trilateral Advanced Development effort. The Military Amphibious Reconnaissance Boat development program

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Program Element: #6.47.17.A

Title: General Combat Support

DOD Mission Area: #216 - Land Combat Service Support

Budget Activity: #6 - Tactical Programs

will be completed, and the boat will be adopted as Standard for the Army, Navy, and Marine Corps. Engineer design tests will be conducted on the 15,000 BTUH multifuel heater. Test models of the 60,000 BTUH multifuel heater will be fabricated and development tests initiated. The 250,000 BTUH multifuel heater will complete engineering development and be type classified. Development tests will be conducted on the 3000/2000 gallon per hour Reverse Osmosis Water Purification Unit and operational test will be initiated. Development of mobilizers (transporters/dollies) for the family of military standard shelters will be continued. Engineering Development of the 20-foot nonexpandable and the two-side expandable shelters will be completed and the shelters type classified. Development and operational test on the S250 and S280 shelters will be continued. Radio frequency and electromagnetic interference protection kits for the nonexpandable shelters will be fabricated for development and operational tests. Development will be completed on the high-capacity X-ray system, and the unit will be type classified. Other items of medical materiel to be type classified include the helicopter-slung, solid and liquid pesticide-dispersal units, the collapsible mosquito light trap, and the low-capacity X-ray system. All necessary experimental work will be performed for each item, and each item will be ready prior to initiating full-scale development.

4. (U) FY 1983 Program: Design of the Bridging for 1985 and Beyond will be completed, prototype units will be fabricated, and engineer design test will be conducted. Engineering Development will be initiated on systems for access to and egress from current bridging. Operational tests on the 3000/2000-gallon-per-hour Reverse Osmosis Water Purification Unit will be completed, the technical data package will be validated for production, and the program will transition to procurement. Development testing will be completed on the 60,000 BTUH multifuel heater, and the unit will be type classified. Development tests will be initiated on the 15,000 BTUH multifuel heater. Development of mobilizers for the new family of military standard tactical shelters will be continued. The nuclear hardened S250 and S280 shelters will be type classified. Fabrication of a hardened 20-foot nonexpandable shelter will be initiated. Development and operational tests will be completed on the radio frequency and electromagnetic interference kits for nonexpandable shelters. Engineering Development will be initiated on a field clinical analysis system. Operational test will be completed on the biological refrigerator, and the unit will be type classified.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # DH01

Program Element: # 6.47.17.A

DOD Mission Area: # 216 - Land Combat
Service Support

Title: Combat Engineer Equipment

Title: General Combat Support

Budget Activity: # 4 - Tactical
Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The existing Army bridging systems are deficient in several areas. The dry-gap-crossing and river-crossing systems are slow to emplace and recover and require excessive manpower. The assault bridge launched from an armored vehicle for crossings under fire is limited in span length. Each of these bridging systems requires a different bridge configuration, and there is no commonality among the systems. In view of the increased capability of the Warsaw Pact to acquire and bring fire on targets such as bridge sites, the key role of tactical bridging on the modern battlefield, and many tasks (including but not limited to bridging) required of the combat engineer, a faster, less labor-intensive integrated system of tactical bridging is needed. This need is being addressed by a joint cooperative United States-United Kingdom-Germany (US-UK-GE) bridging development effort. The tripartite program reduces the development effort required of uncoordinated unilateral programs and could lead to a standardized system of tactical bridging for all three nations. Also included in this project are the full-scale engineering development of systems for improving tactical bridging access and egress and improved watercraft for float bridge erection and other combat support and reconnaissance missions.

B. (U) RELATED ACTIVITIES: The advanced development of the US contribution to the tripartite (US-UK-GE) bridging development program, the tactical bridge access/egress effort, and the watercraft programs are funded under Program Element 6.37.26.A, Combat Support Equipment, Project DC01, Combat Engineer Equipment. The tripartite bridging development program is being directed by an international steering committee consisting of US, UK, and GE representatives. The Marine Amphibious Reconnaissance System is being developed as a joint Army/Navy/Marine Corps effort to satisfy an approved Joint Service Operational Requirement. Related exploratory development work is being conducted under Program Element 6.27.33.A, Mobility Equipment Technology. There is no unnecessary duplication of effort.

C. (U) WORK PERFORMED BY: The in-house work is performed at the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA. There are no current contracts. Contractors for planned efforts are to be determined.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments. Prototypes of the Military Amphibious Reconnaissance System (MARS) were fabricated and development testing (DT) II was completed. The MARS consists of an inflatable watercraft powered by a silenced motor and is required for small unit clandestine amphibious reconnaissance or attack missions. Operational tests (OT II) of the craft were initiated. Full-scale engineering development of the Ribbon Bridge Erection Boat, a 27-foot powerboat used for float bridge erection, rafting, and other combat support missions, was completed. The United Kingdom Combat Support Boat was evaluated, found to meet US requirements for a Ribbon Bridge Erection Boat, and was type classified as US Army Standard.

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Project: # DH01
Program Element: # 6.47.17.A
DOD Mission Area: # 216 - Land Combat
Service Support

Title: Combat Engineer Equipment
Title: General Combat Support
Budget Activity: # 4 - Tactical
Programs

2. (U) FY 1981 Program: The Operational Test (OT II) of the Military Amphibious Reconnaissance System will be completed.

3. (U) FY 1982 Planned Program: The development acceptance in-process review for the Military Amphibious Reconnaissance System will be held. The tripartite (US-UK-GE) tactical bridging development programs will transition to the full-scale engineering development phase. The award of a multiyear contract is expected for the design, fabrication, and testing of second-generation wheeled bridge transporters, bridge structure, and for the adaptation of the bridge launching mechanism to the tracked assault launcher. This bridging equipment and its transporting launchers will incorporate the best system aspects identified from the independent US, UK, and GE advanced development efforts. During FY 1982, design work will be initiated and orders placed for long-leadtime items to support subsequent equipment fabrication. In addition, integrated logistics support and producibility planning will take place.

4. (U) 1983 Planned Program: The design of bridging components will be completed and the fabrication of the second-generation system prototypes will continue. The integrated logistics support planning and the producibility engineering and planning for the bridging development program will continue. The tactical bridge access/egress program for the current system of bridging is expected to transition to full-scale engineering development. Scheduled activities include the preparation of manuals and training packages and the award of a contract for the fabrication of second-generation prototype equipment for Development and Operational Testing (DT II/OT II). The objective of this program is to provide an expedient means for passing traffic over soft or unstable soil conditions which are often encountered on riverbanks, at floating bridge locations, or adjacent to other bridge sites.

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

6. (U) Major Milestones:

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Project: # DH01
 Program Element: # 6.47.17.A
 DOD Mission Area: # 216 - Land Combat
Service Support

Title: Combat Engineer Equipment
 Title: General Combat Support
 Budget Activity: 4 - Tactical
Programs

<u>Major Milestone</u>	<u>Current Milestone Date</u>	<u>Milestones Shown In FY 1981 Submission</u>
Military Amphibious Reconnaissance System Development Acceptance In-Process Review	3 Qtr FY 1982	*
Tactical Bridging System Validation In-Process Review	3 Qtr FY 1982	*
Tactical Bridging Access/Egress Validation In-Process Review	4 Qtr FY 1983	*

*No milestones were reported for these items in FY 1981.

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (Current Requirements)	844	810	5155	9309	Continuing	Not Applicable
Funds (As shown in FY 1981 submission)	759	865	2999	-	Continuing	Not Applicable

(U) The increase of \$85 thousand in FY 1980 funding reflects the increase in the costs for testing the Ribbon Bridge Erection Boat and the Military Amphibious Reconnaissance System.

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Project: # DH01
 Program Element: # 6.47.17.A
 DOD Mission Area: # 216 - Land Combat
 Service Support

Title: Combat Engineer Equipment
 Title: General Combat Support
 Budget Activity: # 4 - Tactical
 Programs

(U) The decrease in FY 1981 funding reflects the application of general Congressional reductions.

(U) In FY 1982 an increase of \$2156 thousand is required to accelerate full-scale engineering development to realign the US program with the trilaterally (US-UK-GE) coordinated schedule. Completion of the Advanced Development effort was delayed because of unforeseen technical difficulties which required advancing the state of the art in tactical bridging for resolution.

(U) Other Appropriations :

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army						
Ribbon Bridge						
Erection Boat:						
Funds (Current	0	9500	13700	0	44662	84772
Requirements)						
Funds (As shown	0	8300	13300	-	45152	79752
in FY 1981						
Submission)						
Quantities	0	100	100	0	326	628
(Current						
Requirements)						
Quantities	0	100	150	-	544	994
(As shown in the						
FY 1981 Submission)						

(U) The FY 1981 and FY 1982 increases in funds are accounted for by inflation. The 1981 quantity has not yet been reduced to reflect higher than expected actual unit cost.

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Project: # D101

Program Element: # 6.47.17.A

DOD Mission Area: # 216 - Land Combat
Service Support

Title: Combat Engineer Equipment

Title: General Combat Support

Budget Activity: # 4 - Tactical
Programs

(U) The FY 1992 unit cost estimate is accurate, and the quantity has been reduced to reflect the latest contract award pricing.

(U) The additional quantities to completion have been reduced based on revised Army requirements. The net effect of this reduction and the increase in unit cost is a reduction in funds for "Additional to Completion" and an increase in "Total Estimated Cost."

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FY 1982 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 DISCUSSION: This program provides for the Engineering Development of conventional tactical shelters (both expandable and nonexpandable) to standardize and minimize the number and types of rigid-wall shelters, and to reduce the proliferation of shelters in the Army inventory. These rigid-wall shelters will become part of the Department of Defense Standard Family of Tactical Shelters which will have rapid emplacement and displacement capabilities; provide self-load/unload trailer/mobilizer for transportation, have a significant positive impact on logistics requirements, and will conform to container standards of the American National Standard Institute (ANSI), and the International Organization for Standardization (ISO) for all modes of transportation. This program also includes providing all military services with a family of hardened tactical shelters designed to protect critical weapons systems and operating personnel from the effects of nuclear (thermal radiation and blast wave), chemical, and biological contamination, resistance to electromagnetic interference, and small arms and fragmentation munitions. There is no current shelter available to counter the combined threat of conventional, nuclear, chemical, or biological warfare.

B. (U) RELATED ACTIVITIES: Each of the military services performs work to develop its service-peculiar shelter; however, to avoid duplication of effort, close coordination is maintained, and common guidance is provided through the Joint Committee on Tactical Shelters (JOCOTAS). Regularly scheduled meetings are held among service participants to ensure technical interface. Additionally, a Joint Logistics Commander's Committee for Tactical Shelters has been formed to ascertain and implement all logistics requirements and aspects for use of tactical shelters. The Army chairs this committee. Shelters developed under this program will be used by other Services. Exploratory Development is performed in PE 6.27.23.A, Clothing, Equipment, and Shelter Technology, Project A427, Tactical Rigid Wall Shelters. Related hardening technology developed in PE 6.21.20.A, Nuclear Effects/Near Millimeter Waves/Fluidics, Project AH25 Nuclear Effects/Near Millimeter Waves/Fluidics, supports the Hardening of Army Tactical Shelters (HATS) program. Advanced Development is accomplished in PE 6.37.26A, Combat Support Equipment, Project D428, Tactical Rigid Wall Shelters.

C. (U) WORK PERFORMED BY: The US Army Natick Research and Development Laboratories, Natick, MA, performs the majority of work on general purpose/conventional tactical shelters, and the US Army Electronics Research and Development Command, Adelphi, MD, in coordination with the Harry Diamond Laboratories, Adelphi, MD, has the lead on hardening of 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; US Army Test and Evaluation Command, Aberdeen Proving Ground, MD; and Mobility Equipment Research and Development Command, Ft. Belvoir, VA. Current contractors are Brunswick Corporation, Harrison, CA; Craig Systems, Lawrence, MA; and Kaman Avadine, Burlington, MA.

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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

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishment: The One-Side Expandable International Organization for Standardization (ISO) Shelter (first of the Army Family of Standard ISO Shelters) was successfully completed. Shelters were fabricated and shipped to various military sites for initiation of worldwide testing by Army personnel. Draft Technical Manuals, System Support Packages, and training procedures were developed. Development Testing II (DT II) at Aberdeen Proving Ground, MD, and Tropic Test Center, Panama, CZ, were conducted, and test data were analyzed. A contract for redesign of components of the One-Side Expandable Shelter was monitored. Contracts for the modification of three government-owned transporters and development of the 20-foot Nonexpandable and Two-Side Expandable Shelters were awarded. Work in support of nuclear hardening programs for the S250/S280 shelters was initiated.

2. (U) FY 1981 Program: Development Testing II/Operational Testing II (DT/OT II) of the One-Side Expandable Shelter will be completed. Test data and redesign components as required will be analyzed. Engineering Development (ED) of the One-Side Expandable Shelter will be completed, and a Development Acceptance In-Process Review (DEVA IPR) will be conducted. The International Organization for Standardization (ISO) mobilizer/transporter modification contract and a contract for the development of the 20-foot Nonexpandable Shelter and the Two-Side Expandable Shelter prototypes will be monitored. Effort on nuclear hardening of the S250/S280 shelters will continue.

3. (U) FY 1982 Planned Program: International Organization for Standardization (ISO) mobilizer prototypes will be reviewed and modified as required. Worldwide testing of the 20-foot Nonexpandable Shelter will be conducted, results will be evaluated and hardware modified, as appropriate. Development Acceptance In-Process Review (DEVA IPR) for the 20-foot Nonexpandable and the Two-Side Expandable Shelter will be conducted. Results of Development Testing II/Operational Testing II (DT/OT II) on the hardened S250/S280 shelters will be evaluated. Radio Frequency Interference/Electromagnetic Interference (RFI/EMI) Kits for the Nonexpandable Shelters will be fabricated and worldwide testing conducted.

4. (U) FY 1983 Planned Program: Development of optimized International Organization for Standardization (ISO) mobilizers for Tactical Shelters will continue. Development Acceptance In-Process Review (DEVA IPR) for the hardened S250/S280 Shelters will be conducted. Development Testing II/Operational Testing II (DT/OT II) for Radio Frequency Interference (RFI) Kits for Nonexpandable Shelters will be completed. A contract for fabrication of a hardened 20-foot Nonexpandable Shelter will be awarded.

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

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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

6. (U) Major Milestones: Not applicable.

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
RDTE						
Funds (current requirements)	2137	5923	2691	1381	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	844	6479	3647	-	Continuing	Not Applicable
Quantities (current requirements)	N/A					
Quantities (as shown in FY 1981 submission)	N/A					

Increase in funding for FY 1980 reflects reprogramming efforts to fund a critical Army requirement for hardened tactical shelters to protect against nuclear, biological, and chemical threats. The decrease of \$556 thousand in the FY 1981 funding level reflects the application of general Congressional reductions. Decrease in funding in FY 1982 reflects delay in contract award from FY 1982 to FY 1983 for fabrication of hardened 20-foot Nonexpandable Shelter prototype.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #6 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	3362	5892	5882	6213	Continuing	Not Applicable (Not Feasible to List)
DLA2	Physical Security	3362	5892	5882	6213	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program element is to conduct engineering development of physical security equipment used to provide protection for critical areas, installations, and the rear area of deployed forces. The need is to use physical security equipment to enhance all DOD security to the maximum extent possible and decrease manpower (guard) requirements to a minimum.

C. (U) BASIS FOR FY 1982 RDTE REQUEST:

1. (U) Complete Army testing and evaluation of Engineering Development (ED) Models of the Interim Facility Intrusion Detection System (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 conducted at the Electronics Proving Ground, Fort Huachuca, AZ, and Operational Test II will be conducted at the US Army Communication Electronics Board (USACEB), Ft. Gordon, GA. These Interim FIDS components will be type classified in FY82. 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 (CNSD) 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. Engineering Development will be initiated on the Covert Duress Sensor and the Contraband Sensor.

2. (U) FIDS development costs have been validated in the FIDS Baseline Cost Estimate.

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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 1981 Submission
Type Classification (TC) of Interim FIDS	FY82	FY82
TC of Advanced FIDS, Group I	FY84*	FY83
TC of Electronic Alerting System	TBA**	FY83
TC of Advanced FIDS, Group II	FY84	FY84
TC of Group I Components of Security Lighting and Barriers System	FY85	FY85

*Development of Advanced FIDS Group I was held in abeyance until contractual problems on the Interim FIDS were resolved.
 **Scheduling the Type Classification (TC) date of the Electronic Alerting System depends on decisions to be made at a special in-process review to be held in FY81.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	3362	5892	5882	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4336	6279	5747	Continuing	Not Applicable

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Program Element: #6.47.18.A Title: Physical Security
DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: 14 - Tactical Programs

The FY80 decrease was a result of reprogramming to higher priority programs. Decrease in FY81 is attributable to the application of general Congressional reductions. The FY82 increase is due to inflation.

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Other Procurement, Army:						
Funds (current requirements)	4400	8900	5700	2900	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	3400	8600	5900	-	Continuing	Not Applicable

Increase in FY80 was due to inflation and additional sensor buys to support requirements. Inflation caused increase in FY81, and total obligational authority limitations caused decrease in FY82.

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Program Element: #6.47.18.A

Title: Physical Security

DOD Mission Area: #216 - Land Combat and Service Support

Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Objective is to conduct all design, development, test, and evaluation required to provide the technological base and establish the concept feasibility necessary to proceed into engineering development of complete, integrated physical security systems to protect materiel, bases, facilities, installations, and personnel against theft, sabotage, or espionage. Developments will be directed towards satisfying the Navy, Air Force, and Army 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 to advanced development is to provide a DOD system overview via systems analysis. Development will include the following: (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) devices to provide physical security for the rear area of deployed forces; (7) standardized securing equipment and locking hardware; and (8) 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 (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: The Interim Facility Intrusion Detection System (FIDS) is being developed under PE 6.47.18A, 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 Night Vision and Electro-Optics

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

Laboratory, (NV and EOL) Fort Belvoir, VA. Major contractors are GTE Sylvania, Mountainview, CA; Soncraft, Chicago, IL, and MELPAR, Falls Church, VA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments:

a. (U) Joint-Service 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). 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 completed in FY79.

b. (U) Facility Intrusion Detection System (FIDS): In FY78 the first DT II/OT II models of the Command, Control Display Subsystem (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 to Central Master Control interface. During FY80, design and development continued on Interim and Advanced Group I components. Also in FY80, a separate contract was awarded to prepare user guidelines for FIDS.

2. (U) FY 1981 Program: The Interim FIDS Components contract will be completed and those items will undergo Engineering Development Test (EDT), DT II and OT II. Contract effort for Advanced Group I components will continue and DT II of Interim FIDS will be conducted. Data will be procured for Portable Duress Sensors. Development of the Video Surveillance Subsystem completed and contract efforts will be required for software modification, installation of the FIDS at the OT test site and technical assistance in the integration of FIDS with other DOD physical security components. In-house efforts are required to ensure items comply with contract requirements and to coordinate between contractor, NV&EOL and Test and Evaluation Command (TECOM). Development of the FIDS surveillance subsystem will be continued.

3. (U) FY 1982 Planned Program: Design and Fabrication of the ADV GP I FIDS components will be completed in FY82, and EDT, DT II, and OT II will be initiated prior to the close of the FY. A Development Acceptance (DEVA) IPR for Interim FIDS

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Program Element: 96.47.18.A

Title: Physical Security

DOD Mission Area: #216 - Land Combat and Service Support Budget Activity: #6 - Tactical Programs

will be held in 2QFY82. Contracts will be awarded for Engineering Development of the Covert Duress Sensor and the Contraband Sensor. The System Engineering Support Contractor's efforts in DOD component integration with FIDS will continue. In-house effort is required to ensure that items comply with contract requirements, to prepare and conduct the DEVA IPR, and in Europe to validate the use of modified J-SIIDS components for Electronic Alerting System (EAS) applications. An EAS SIPR will be held in FY82.

4. (U) FY 1983 Planned Program: For FIDS, complete DT II/OT II of ADV GPI Components and prepare for a DEVA IPR to be held in 1Q84. DT II/OT II will be initiated on the Covert Duress Sensor and Contraband Sensor in 4Q83. Engineering Development will be initiated for selected components for Advanced FIDS and Rear Area Security. For Lighting and Barriers, fabrication of DT II/OT II models of Silhouette Luminaires and Personnel Barriers will be initiated.

5. (U) Program to Completion: This is a continuing program. In FY84 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.

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	4950	2701	1056	0	Continuing	Not Applicable
	XM19 Alarm					-	28
	XM2 Sampler					-	28
DF45	Biological Defense Materiel	4950	2701	1056	0	Continuing	Not Applicable

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 and the XM2 Biological Sampler. The M42 Alarm, a fielded device, completes the system. The XM19 Alarm is a point sampling and analysis device which detects the presence of biological aerosols and provides an alarm. The collocated 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 is an Alarm unit which gives visual and aural indications of contamination. The system will provide Corps, Division, and Brigade levels an array of BDWS for large-area rapid warning.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Engineering Development (ED) will continue and Development Acceptance In-Process Review (DEVA-IPR) will be accomplished leading to type classification (TC) of the Biological Detection and Warning System (BDWS) XM19/XM2. First production contract will be awarded on the BDWS.

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Program Element: #6.47.24.A

DOD Mission Area: #215 - Land Combat Support

Title: Biological Defense Materiel

Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	4950	2701	1056	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4439	2927	2850	0	27251

The increased FY 1980 funding is due to slippage in delivery of test items and higher actual cost for contractual effort than initially estimated and the reprogramming of excess funds to other Army programs.

The FY 1981 funding decrease reflects the application of general Congressional reductions. The decrease in FY82 is the result of a decrease in program effort and is adequate to complete development of the Biological Detection and Warning System (BDWS).

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
OPA Funds						
Funds (current requirements)	0	0	0	2800	19300	22100
Funds (as shown in FY 1981 submission)	0	0	2500	-	13800	16100
Quantities (current requirements)						
Biological Detection and Warning System, XM19/XM2	0	0	0	78	436	22100

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

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Quantities (as shown in FY 1980 submission)	0	0	71	-	147	Not Applicable

First production of the BWDS slipped from FY82 to FY83.

Funding and quantity changes are the result of adjustments in the Basis of Issue (BOI) for the BWDS by the user community.

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

Title: Biological Defense Materiel
Budget Activity: #4 - 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 corps, 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. Contractors: 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 1980 and Prior Accomplishment: During FY's 1979 and FY 1980 the following were accomplished relative to development of the biological detection and warning system (BDWS), XM19/XM2: (a) continued evaluation of the XM19 detector air handling system, alarm algorithm, and 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. In FY 1980 the following were accomplished: (a) Fabrication of the prototype items for test and evaluation was completed; (b) Contractor testing began in August 1980, and is scheduled to be completed December 1980; (c) Overall planning and management of the test and evaluation activities have been placed under a Configuration Control Board (CCB) Subcommittee having representatives from the technical support, product assurance and contractor communities.

2. (U) FY 1981 Program: Engineering Development will continue on the Biological Detection and Warning System (BDWS). Contractor and government laboratory testing program will be completed which will provide comprehensive data addressing all issues which will be assessed at a laboratory-held Research and Development Acceptance Review in 1st Qtr FY81. A special

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Program Element: #6.47.24.A

DOD Mission Area: #215 - Land Combat Support

Title: Biological Defense Materiel

Budget Activity: #4 - Tactical Programs

In-Process Review (IPR) will be held in 2nd Qtr FY 81, concurrent with the planned initiation of Development Test II (DT II) at Dugway Proving Ground, Utah. Operational Test II (OT II) will be initiated during 3rd Qtr FY81 at Fort Stewart, Georgia.

3. (U) FY 1982 Planned Program: All formal testing (DT II/OT II) will be completed on the BDWS. Development Acceptance In-Process Review (DEVA-IPR) and type classification (TC) of the BDWS will be completed in FY82 leading to the first production of BDWS during FY 1983.

4. (U) FY 1983 Planned Program: This project is not funded in FY 1983.

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.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.25.A

DOD Mission Area: #215 - Land Combat Support

Title: Chemical Defense Materiel

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
	TOTAL FOR PROGRAM ELEMENT	12107	17659	38555	43095		
DF97	Chemical Defense Materiel	1027	1914	1849	4739	Continuing	Not Applicable
D017	CB Collective Protection	400	1420	8508	3757	Continuing	Not Applicable
D019	Individual Chemical Protection	4980	2347	4109	0	Continuing	Not Applicable
D020	Chemical Detection Warning and Sampling Devices	1639	2708	12530	25035	Continuing	Not Applicable
D023	Collective Protection Materiel for Armored Vehicles	3461	7308	10716	9021	Continuing	Not Applicable
D138	Training System for Chemical Defense	600	1962	843	543	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to conduct engineering development of 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 realistically simulate persistent and nonpersistent chemical agent attacks in a variety of combat scenarios. The new protective mask in development, 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, improved periphery to improve fit, and improved respiratory protection with minimum burden to the wearer. 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 by provision of early and more sensitive warning devices. An improved decontamination system will provide 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

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

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

headquarters and communications functions and certain armored vehicles and their crews in order to accomplish their assigned missions in an active chemical environment and to relieve the stresses and restrictions inherent in wearing individual protective clothing and equipment. The above improvements are essential to maintain a totally integrated chemical defense posture.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Engineering development (ED) program will be completed on a new protective mask leading to type classification. In the chemical agent detection and alarms area, ED will be completed on the Chemical Attack Warning and Transmission System. Additionally, ED will continue on a remote sensing alarm, a hand-held contamination monitor for nerve agents and the M256 Detection Kit Simulator. Development will continue on NBC collective protection for combat vehicles, and modular collective protection equipment applications for tactical command shelters. Work will continue on the development of decontamination systems for clothing and a rapid decontamination system for tactical vehicles.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	12107	17659	18555	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	18367	20627	41158	Continuing	Not Applicable

(U) DF97 - This project was decreased by \$3264 thousand in FY 1980, and \$4108 thousand in FY 1982 because several decontamination items were not/will not be ready to enter engineering development (ED) as planned because of lack of approved requirement documents and/or proven technology.

(U) DO17 - The funding adjustments (\$205 thousand increase in FY 1980 and \$645 thousand decrease in FY 1982) are a result of the adjusted requirements/priorities established by the user for the integration/application of modular collective protection equipment applicable to tactical vans, shelters, and command posts. The remaining \$252 thousand decrease in FY 1982 funding requirement is due to realigning program to reflect incremental funding policies.

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

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

- (U) D019 - The \$2327 thousand increase in FY 1980 supports the expanded/accelerated in-house and contractor efforts to solve technology problems associated with the new mask program. The \$387 thousand increase in FY 1982 is the result of refinement in cost estimates to complete ED on the new protective mask.
 - (U) D020 - The \$865 thousand increase in FY 1980 supported the completion of ED and Type Classification of the XM9 Liquid Agent Detector paper. The \$1870 thousand increase in FY 1982 reflects refined funding estimates for continuation and initiation of ED of various detection and alarm items.
 - (U) D023 - The FY 1980 decrease (\$6399 thousand) results from \$1999 thousand being reprogramed into the companion advanced development Program Element 6.37.21A, Chemical Defense Materiel Concepts, Project DJ30, Collective Protection Materiel for Armored Vehicles, \$3461 thousand reprogramed to selected vehicle programs (such as ROLAND and Improved TOM Vehicle) for work associated with integration application of collective protection to armored vehicles and \$939 thousand reprogramed to non-chemical programs. The balance was adequate to conduct the revised program. The FY 1982 increase (\$265 thousand) results from program adjustments.
 - (U) D138 - The \$6 thousand increase in FY 1980 represents a minor program adjustment to meet actual fund requirements. The decrease in FY 1982 (\$1914 thousand) was the result of program realignment and refinement of cost estimates.
 - (U) The FY 1981 funding decreases for projects DF97, D017, D020, D023, and D138 reflect the application of general Congressional reductions.
- E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands). Not Applicable.

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

Title: Chemical Defense Materiel
Budget Activity: #6 - 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. Related Advanced Development work is being performed under Program Element 6.37.21.A, Chemical Defense Materiel Concepts.

H. (U) WORK PERFORMED BY: In-house efforts are performed by US Army Chemical Systems Laboratory, Edgewood, MD. Prime Contractors are Sierra Engineering Company, Sierra Madre, CA; Bendix Corporation, Baltimore, MD; Mine Safety Appliance Co., Murrysburg, PA; Honeywell, Inc., Orlando, FL; Donaldson Co., Minneapolis, MN; and Brunswick Corporation, Deland, FL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: During FY 1978, the new protective mask, XM29, entered the engineering development (ED) phase. During FY 1979: (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 simulator entered ED, and (4) Development Test II and Operational Test II (DT/OT II) were completed on the Liquid Agent Detector (LAD) paper. During FY 1980: (1) ED was continued on the XM30 configuration of the new protective mask including engineering design testing and completion of tooling for DT/OT II hardware. (2) The M9 paper was adopted as an

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

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

expendable stock fund item to be included in Common Table of Allowance (CTA) 50-97 and initial procurement action begun. (3) ED was also continued on the application of Modular Collective Protection Equipment (MCPE) to tactical command posts, training simulators for airburst persistent and non-persistent agents, and the Chemical Attack Warning and Transmission System (CAWTS). ED was initiated on (1) the XM14 Truck-Mounted Mounted Decon Apparatus to replace the M12A1 Decon Apparatus and (2) the M8 Chemical Alarm Simulator, XM81.

2. (U) FY 1981 Program: ED efforts will continue on separate lens configuration of XM30 Mask which includes: (1) conduct in-house engineering tests, (2) fabricate Development Test/Operational Test (DT/OT) items, and (3) initiate DT/OT II test. ED will continue on Chemical Agent Warning Transmission System (CAWTS), XM14 Truck-Mounted Decontamination Apparatus, NBC Collective Protection equipment for armored vehicles, modular collective protection equipment application to tactical command shelters, training simulators for persistent and nonpersistent agent attack, and the XM81, M8 Chemical Alarm Simulator. ED will be initiated on the XM21 Remote Sensing Chemical Agent Alarm, handheld contamination monitor for nerve agents and the M256 Detector Kit Simulator.

3. (U) FY 1982 Planned program: ED will be completed on the XM30 Protective Mask; Chemical Attack Warning and Transmission System; XM14 Truck-Mounted Decontamination Apparatus; XM81, M8 Chemical Alarm Simulator, and the XM11 Airburst Simulator including: (1) complete DT/OT II, (2) conduct Development Acceptance In-Process Review (DEVA-IPR) and type classify, and (3) initiate first production procurement. ED will be continued on the XM21 Remote Sensing Chemical Agent Alarm, handheld contamination monitor for nerve agents, NBC collective protection for combat vehicles, and modular collective protection equipment applications for tactical command shelters and the M256 Detector Kit Simulator. ED will be initiated on the Large-Scale Decon Device (Jet Exhaust), Clothing Decontamination System, combat vehicle alarm to be integrated with hybrid collective system, and detector kit for waterborne chemical warfare agents.

4. (U) FY 1983 Planned Program: ED will continue on: (1) the Large-Scale Decontamination Device (Jet Exhaust) and Clothing Decontamination System; (2) modular collective protection equipment application to tactical shelters; (3) aerial and ground disseminators for chemical agent attack simulation; and (4) XM21 Remote Sensing Chemical Agent Alarm, handheld nerve agent contamination monitor, detector kit for waterborne chemical agents, and combat vehicle alarm. ED will be initiated on: (1) Vehicle Interior Surface Decontamination System; (2) improved training simulator; and (3) improved M256 Detector Kit Simulator for use with training simulants, Advanced Chemical Agent Detector and Alarm (ACADA), and the Automatic Liquid Agent Detector (ALAD).

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: D017

Program Element: #6.47.25.A

DOD Mission Area: #215-Land Combat

Title: CB Collective Protection

Title: Chemical Defense Materiel

Budget Activity: #4-Tactical Program

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The reported use of Chemical agents in Laos and Afghanistan has intensified the efforts to enhance the capability of United States (US) forces to fight and win in a chemically contaminated environment. Consistent with these efforts to improve US Chemical Biological (CB) defense posture, the Army has a requirement for overpressure type of collective protection for 49 systems (tactical vans, shelter, command posts, fire control stations, etc). This program supports the development of Chemical Biological collective protection capability for the above systems. Modular Collective Protection Equipment (MCPE) addresses the above needs and provides Nuclear-Biological-Chemical (NBC) protection by providing filtered air under positive pressure to prevent infiltration of toxic chemical, biological agents and radioactive aerosols. MCPE allows individuals to engage in combat operations unencumbered by wearing individual CB protection equipment which severely degrades operational capabilities.

B. (U) RELATED ACTIVITIES: The Army's CB collective protection RDTE program includes meeting its own materiel development needs and performing basic research (6.1) through advanced development (6.3) and some engineering development (6.4) work for the other Services within DOD. DOD Directive 5160.5 established the joint RDTE program and assigned executive agent responsibility to the Army. The work in this project does not duplicate service unique work being done by the Air Force or Navy. Companion advanced development work is being done under program element 6.37.21.A, Chemical Defense Materiel Concepts, Project D604, Collective Chemical protection materiel. Related basic research is being done under Program Element 6.11.02.A, Defense Research Sciences, Project A71A, Defense Systems Chemical Warfare/Biological Warfare. Related Exploratory Development work is being done under Program Element 6.27.06.A, Chemical Biological Defense and General Investigations, Project A553, Chemical Biological Defense and General Investigations.

C. (U) WORK PERFORMED BY: In-house efforts are performed by US Army Chemical Systems Laboratory, Edgewood, MD. Prime contractors are American Air Filter, Inc., Ellicott City, MD, and Brunswick Corporation, Deland, FL.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments The development program for Modular Collective Protection Equipment (MCPE) was initiated in 1967 with completion of Development Test II during August 1975. MCPE components are type classified (TC) based on parent system requirement and compatibility testing. MCPE for Tactical Fire Control System (TACFIRE) shelter was type classified during March 1976 and first production accomplished during August 1977. Type classification of MCPE for the AN/TSQ-73 (Missile Minder) shelter was accomplished in June 1978. Development of MCPE for the Patriot surface-to-air missile system was continued during FY 1979 and FY 1980.

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Project: D017
 Program Element: #6.47.25.A
 DOD Mission Area: #215-Land Combat

Title: CB Collective Protection
 Title: Chemical Defense Materiel
 Budget Activity: #4-Tactical Program

2. (U) FY 1981 Program: Work will continue on Modular Collective Protection Equipment (MCPE) development for integration/application to tactical vans, shelters, command posts, communication centers, fire-control stations and associated equipment in consonance with priorities established by the user. Type classification will be sought for those applications of MCPE where compatibility tests have demonstrated the capability of the MCPE for servicing these items. Compatibility and pressurization tests will continue on MCPE for the Patriot surface-to-air missile system.

3. (U) FY 1982 Planned Program: All development related to MCPE for the Patriot surface-to-air missile system will be completed and Type Classification will be accomplished. Work will continue on MCPE applications in consonance with the priorities established by the user. Efforts will be directed toward developing MCPE for the following top priority items from a list of 49 systems that have been identified by the user as requiring collective protection: (1) All-Source Analysis System (ASAS), (2) Standoff Target Acquisition System (SOTAS), (3) Trailblazer upgrade (intelligence and electronic warfare system), (4) Teampack, AN/MSQ103 (intelligence system), (5) Artillery Location Radar, AN/TPQ-37, and (6) ground control station for Remotely Piloted Vehicle.

4. (U) FY 1983 Planned Program: Development work will continue on MCPE which will be employed in the following tactical situations requiring collective protection: (1) command posts, (2) communication centers, (3) fire-control stations, (4) control complexes, first aid stations, field hospitals, and rest and relief stations.

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

6. (U) Major Milestone: Not applicable.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	400	1420	8508	3757	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	195	1546	7611	-	Continuing	Not Applicable

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Project: D017
Program Element: #6.47.25.A
DOD Mission Area: #215-Land Combat

Title: CB Collective Protection
Title: Chemical Defense Materiel
Budget Activity: #4-Tactical Program

The funding adjustments (\$205 thousand increase in FY 1980 and \$897 thousand increase in FY 1982) are a result of the adjusted requirements/priorities established by the user for the integration/application of modular collective protection equipment to tactical vans, shelters and command posts. The FY 1981 decrease reflects the application of general Congressional reductions.

Other Appropriations: Not Applicable.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D020

Program Element: #6.47.25.A

DOD Mission Area: #215 - Land Combat

Title: Chemical Detection Warning Sampling Devices

Title: Chemical Defense Materiel

Budget Activity: #4 - Tactical Program

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Soviet and Warsaw Pact forces have developed and fielded extensive Nuclear-Biological-Chemical (NBC) defense-related equipment. The degree of NBC preparedness maintained by these forces indicates a willingness on their part to engage in NBC warfare. By comparison, United States (US) forces possess inadequate, aging, and logistically burdensome NBC detection, warning, and identification equipment. The objective of this project is the Engineering Development (ED), through type classification, of new and improved chemical detection, warning, sampling, and identification devices to supplement or replace existing items for field and installation use.

B. (U) RELATED ACTIVITIES: The Army's chemical detection and warning RDTE program includes meeting its own materiel development needs and performing basic research (6.1) through advanced development (6.3) and some engineering development (6.4) work for the other Services within DOD. DOD Directive 5160.5 established the joint RDTE program and assigned executive agent responsibility to the Army. This project does not duplicate Service-unique work being done by the Air Force and Navy. Companion advanced development work is being done under Program Element 6.37.21.A, Chemical Defense Materiel Concepts, Project D601, Chemical Detection and Warning Materiel. Related basic research is being done under Program Element 6.11.02.A, Defense Research Sciences, Project A71.A, Defense Systems Chemical Warfare/Biological Warfare. Related Exploratory Development work is being done under Program Element 6.27.06.A, Chemical Defense and General Investigations, Project A553, Chemical Biological Defense and General Investigations.

C. (U) WORK PERFORMED BY: In-house efforts are performed by the US Army Chemical Systems Laboratory, Aberdeen Proving Ground, MD. Prime contractors are Bendix Corporation, Baltimore, MD; Mine Safety Appliance Co., Murrysville, PA; and Honeywell, Inc., Orlando, FL.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: During FY 1978: Advanced development (AD) was completed and Engineering development (ED) initiated on the Liquid agent detector (LAD); biomedical testing of B-1 dye component of Liquid agent detector (LAD) was completed, and the data confirms that the dye is mutagenic; a program was initiated to replace the mutagenic B-1 dye, and a modified protocol was approved by the Surgeon General for use of the LAD in field testing. During FY 1979, accomplishments included: (1) the improved airburst simulator entered ED, and (2) Development Test II and Operational Test II (DT II/OT II) were completed on the Liquid agent detector (LAD) paper. During FY 1980: (1) the M9 paper was adopted as an expendable stock fund item to be included in Common Table of Allowance (CTA) 50-970 and initial procurement

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Project: #D020
Program Element: #6.47.25.A
DOD Mission Area: #215 - Land Combat

Title: Chemical Detection Warning Sampling Devices
Title: Chemical Defense Materiel
Budget Activity: #4 - Tactical Program

was begun; (2) ED was continued on the Chemical Attack Warning and Transmission System (CAWTS); and (3) ED was initiated on the M8 Chemical Alarm Simulator, XM81.

2. (U) FY 1981 Program: ED will continue on the Chemical Attack Warning and Transmission System (CAWTS) and the M8 Chemical Alarm Simulator, XM81. ED will be initiated on the XM21 Remote Sensing Chemical Agent Alarm, handheld contamination monitor for nerve agents, and the M256 Detector Kit simulator.

3. (U) FY 1982 Planned Program: ED will be completed on the Chemical Attack Warning and Transmission System (CAWTS) and the M8 Chemical Alarm Simulator, XM81. ED will be continued on the XM21 Remote Sensing Chemical Agent Alarm, handheld contamination monitor for nerve agents, and the M256 Detector Kit simulator. ED will be initiated on the combat vehicle alarm to be integrated with hybrid collective system and detector kit for waterborne chemical warfare agents.

4. (U) FY 1983 Planned Program: ED will continue on the XM21 Remote Sensing Chemical Agent Alarm, handheld nerve agent contamination monitor, detector kit for waterborne chemical agents and the combat vehicle alarm. ED will be initiated on the M256 Detector Kit simulator for use with training simulants, Advanced Chemical Agent Detector and Alarm (ACAADA), and the XM82 Automatic Liquid Agent Detector Alarm (ALAD).

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

6. (U) Major Milestones: Not applicable

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Project: #D020
 Program Element: #6.47.25.A
 DOD Mission Area: #215 - Land Combat

Title: Chemical Detection Warning Sampling Devices
 Title: Chemical Defense Materiel
 Budget Activity: #4 - Tactical Program

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	1639	2708	12530	25035	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	774	4543	10660	-	Continuing	Not Applicable
Quantities (current requirements)						
Quantities (as shown in FY 1981 submission)						

The \$865 thousand increase in FY 1980 was required to complete ED and type classification (TC) of the XM9 Liquid Agent Detector paper. The FY 1981 decrease reflects the application of general Congressional reductions. The \$1870 thousand increase in FY 1982 represents refined funding estimates for continuation and initiation of ED of various detection and alarm items.

Other Appropriations: Not Applicable.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D021 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 Department of Defense (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. Such a plan was provided in February 1978. 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 the current vehicle 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 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 which severely degrades operational capability.

B. (U) RELATED ACTIVITIES: This was a new start in FY80. Related work has been done under Program Element (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. Related basic research is being done under Program Element 6.11.02.A, Defense Research Sciences, Project A71A, Defense Systems Chemical Warfare/Biological Warfare. Related Exploratory Development work is being done under Program Element 6.27.06.A, Chemical Biological Defense and General Investigations, Project A553, Chemical Biological Defense and General Investigations. Companion Advanced Development effort is performed under Program Element 6.37.21.A, Chemical Defense Materiel, Project DJ30, Collective Protection Materiel-Armored Vehicles. 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 and is not duplicated in other research and development projects.

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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

C. (U) WORK PERFORMED BY: US Army Tank-Automotive 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 are being performed by Donaldson, Minneapolis, MN. Honeywell, Minneapolis, MN, is the prime contractor for the development of the Hybrid Collective Protection Equipment.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: This project was a new start during FY 1980, and the following significant activities were accomplished: Vehicle interface development was initiated in preparation for the application of ventilated facemask-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) Cavalry Fighting Vehicle, (3) Multiple Launch Rocket System, (4) Improved TOW Vehicle, (5) US ROLAND, (6) XM1 Main Battle Tank, (7) Division Air Defense, (8) XM109 Self-Propelled Howitzer, and (9) M677A1 Command Post Carrier. The hybrid (combination ventilated facemask and positive pressure) is the collective protection system of choice for the XM1 Tank, US ROLAND, Multiple Launch Rocket System (MLRS) Division Air Defense (DIVAD) Gun, Armored Forward Area Rearm Vehicle (AFARV), Forward Area Alerting Radar (FARR), and NBC Reconnaissance Vehicle. A major thrust of the 1980 program was to reduce the US ROLAND vulnerability in a nuclear, biological, chemical (NBC) warfare environment. This is to ensure integration of NBC protective equipment on the US ROLAND in time for full production. Development was initiated on Technical Data Packages for incorporating the ventilated facemask on the designated vehicles.

2. (U) FY 1981 Program: Work initiated in the previous year on the application of collective protection equipment on the US ROLAND Air Defense System will continue. Work will continue on vehicle interface development in preparation for the application of either the ventilated face mask or the hybrid type of NBC collective protection 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. Development will continue on Technical Data Packages for incorporating the ventilated facemask on the designated vehicles. Preproduction engineering and support activities for the application of protection systems to selected vehicles (including XM1) will be initiated.

3. (U) FY 1982 Planned Program: All Technical Data Package work initiated in prior years will be completed. Preproduction engineering and support activities for the application of protection systems to selected vehicles will be continued as required. Current plan is to type classify the hybrid collective protective system directly from Advanced

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Project: #D021
 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

Development (AD) during FY 1983. All necessary experimental work will be performed and the hybrid collective protection system will be ready for full-scale development during FY 1983.

4. (U) FY 1983 Planned Program: Continue preproduction engineering and support activities as required for the application of protective systems to selected vehicles.

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

6. (U) Major Milestones: Not applicable.

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

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>FY 1983</u>	<u>Additional</u>	<u>Total</u>
	<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>to Completion</u>	<u>Estimated</u>
						<u>Cost</u>
RDTE						
Funds (current requirements)	3461	7308	10716	9021	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	9860	7849	10451	-	Continuing	Not Applicable

The FY 1980 decrease (\$6399 thousand) results from \$1999 thousand being reprogrammed into the companion advanced development Program Element 6.37.21.A, Chemical Defense Materiel Concepts, Project DJ30, Collective Protection Materiel for Armored Vehicles, \$3461 thousand reprogrammed to selected vehicle programs (such as ROLAND and Improved Tow Vehicle) for work associated with integration/application of collective protection to armored vehicles and \$939 thousand reprogrammed to non-chemical programs. The balance was adequate to conduct the revised program.

The FY 1981 decrease reflects the application of general Congressional reductions.

The FY 1982 increase (\$265 thousand) is the result of refinement in program cost estimate.

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FY 1982 RDT&E 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 83 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	21436	20931	15356	16560	9028	114103
D187	Military Computer Family	0	0	0	4146	Continuing	Not Applicable
DC98	Position Location Reporting System	10100	11129	9830	9564	6520	68039
D183	Tactical Display System	842	2413	3003	2850	2508	14127
D184	Tactical Computer System/ Tactical Computer Terminal	9000	7389	2523	0	0	18912
D284	Battery Computer System	1042	0	0	0	0	11408
A570	Mortar Fire Control Calculator	452	0	0	0	0	1617

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program consists of three principal projects. 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 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 Display System (TDS) is needed to annotate standard military maps in near-realtime 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 Tactical Computer System/Tactical Computer Terminals (TCS/TCT) satisfy Army needs for intelligent terminals for automated field data processing systems. This equipment makes available to the Army a near-term standard set of modular, militarized, automatic data processing equipment 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 nature of TCS and TCT further permits product

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Program Element: #6.47.27.A

Title: Command and Control

DOD Mission Area: #2.4 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

Improvements to be accomplished 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 1982 ROTE REQUEST:

1. (U) The Position Location Reporting System (PLRS) will complete operational testing (OT II) which will thoroughly test the Engineering Development System. Automatic test equipment software development will be continued. Support efforts will concentrate on production engineering and product assurance. Development of skill performance aids will be started. The Tactical Display System will continue in the prototype development of a US-based technology; namely, Light Emitting Diode (LED), and a foreign technology--laser display developed by Elektro-Spezial in Germany. Test and Evaluation of the LED and laser prototype displays will be conducted. A selection of either the LED or laser approach will be made for the full-scale development of the Tactical Display System in the second half of FY 1982. Funds requested for the Tactical Computer System/Tactical Computer Terminals (TCS/TCT) will complete Test Measurement and Diagnostic Equipment (TMDE) programing efforts on the USM-410 for the TCS/TCT printed circuit boards/modules. A Development Acceptance in-Process Review (DEVA-IPR) will be conducted. 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.

2. (U) For the Position Location Reporting System a baseline cost estimate was completed and validated by the cost analysis office of CORADCOM. Program risk is considered low. For the Tactical Display System, an independent government cost estimate was validated by the cost analysis office of CORADCOM. This cost estimate covers the entire development program through engineering development. The program risk was considered low with regard to technical performance and schedule, and a moderate risk associated with overall cost due to the unknowns associated with Light Emitting Diode module producibility. Subsequently, module producibility has been established in FY 1980, and therefore the cost risk is now considered low. For the TCS/TCT the government estimate is based upon actual past experience of similar work and the Army has high confidence that the program will be completed within the total cost estimate.

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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) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	21436	20931	15356	21442	114103
Funds (as shown in FY 1981 submission)	22579	25015	14109	19371	116168

The decrease in FY 1981 is attributable to the application of general Congressional reductions. The increase in FY 1982 represents consideration of the budget amendment, inflation, and higher civilian pay indices.

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Program Element: #6.47.27.A

DOD Mission Area: #254 - Tactical Command and Control

Title: Command and Control

Budget Activity: #4 - Tactical Programs

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
Other Procurement Army						
Battery Computer System						
Funds (current requirements)	14600	35400	46700	29800	43700	170200
Funds (as shown in FY 1981 submission)	14600	35000	45000	31300	21800	147700
Quantities (current requirements)	89	168	217	147	186	807
Quantities (as shown in FY 1981 submission)	Not Submitted					
Mortar Fire Control Calculator						
Funds (current requirements)	0	1000	2800	2900	6600	13300
Funds (as shown in FY 1981 submission)	0	1000	2200	2300	5000	10500
Quantities (current requirements)	0	126	560	560	1340	2586
Quantities (as shown in FY 1981 submission)	Not Submitted					
PLRS						
Funds (current requirements)	0	0	31300	46700	No Change	269600
Funds (as shown in FY 1981 submission)	0	0	22000	22800	82100	126900

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Program Element: #6.47.27.A

DOD Mission Area: #254 - Tactical Command and Control

Title: 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 firepower. 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 can 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 units as integral relays to achieve over-the-horizon transmission and overcome terrain obstruction to line-of-site communications. The Position Location Reporting System entered full-scale engineering development in 1976. Two master units and 64 user units in various configurations are scheduled for delivery and government testing FY81. The ASARC III review is scheduled for second quarter FY 1982, and the Initial Operational Capability date is third quarter FY 1984. 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. The Army assimilated development of TCS/TCT as components of the Tactical Operations System (TOS). When TOS was denied authorization, without prejudice, in FY 1980, the Army notified the Congress that this project would continue and subsequently received approval of a \$9.0 million Congressional reprogramming to support development in FY 1980. Operationally the TCS/TCT will be the equipment used for the maneuver control portion of the Force Level and Maneuver Control System, SIGMA, being developed under program element 2.37.40 A D484, Force Level and Maneuver Control System. This equipment is compact and fully militarized, thus enabling it to be employed in

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Program Element: #6.47.27.A

Title: Command and Control

DOD Mission Area: #254 - Tactical Command and Control

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the M-577 armored command post carrier in the field at various echelons or in other shelter/van environments. The modular structure of the Tactical Computer System/Tactical Computer Terminals (TCS/TCT) permits them to be product-improved as requirements, technology changes, and life cycle cost consideration dictate. This structure further increases the flexibility for satisfying diverse systems requirements as well as long-range adaptability to emerging Military Computer Family (MCF) equipment. Without the availability of TCS/TCT, the Army would be forced to continue the proliferation of individual unique terminal and processor systems for each system under development. This results in unacceptable duplication of research and development costs and increased development time, and creates an intolerable logistics and training burden for multiple ADP equipment. This would greatly restrict the Army's capability for realizing improved continuity of operations by sharing critical ADP resources when the need arises under adverse conditions. A 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, fixed price incentive (FPI) type, was awarded for the engineering development hardware.

G. (U) RELATED ACTIVITIES: The US Marine Corps is funding 40% of the Position Location Reporting System (PLRS) development under Program Element 6.47.19.H, 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 6.37.13.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. Advanced Development of 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 (GE) and 50 percent under PE 6.37.23.A (Integration of Army Tactical Data System). Memorandums of Understanding between the US and GE 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. For TCS/TCT, the initial maneuver control capabilities have been fielded in Europe using engineering development models. The support of this effort is funded under Program Element 2.37.40.A, D484.

H. (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. A contract for the TDS

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was awarded by CORADCOM, Ft Monmouth, NJ, to Litton Data Systems, Van Nuys, CA, for LED module fabrication. 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 Officer, Tactical Computer System/Tactical Computer Terminal (TCS/TCT), under Project Manager, Operations Tactical Data Systems (PM, OPTADS), US Army Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ. Primary contractor is the Singer Co., Librascope Division, Glendale, CA.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: For PLRS, software programing on the USM-410, the general support automatic test equipment, has been initiated as part of the ILS contract. Software programing on the USM-410, the general support automatic test equipment, will be initiated. Hardware and software development of PLRS continued. Batteries, maintenance, and spares were purchased. Preliminary Qualification Tests by the contractor (PQT-C) were started. For the Tactical Display System (TDS), the US and German governments have negotiated and concluded agreements in FY 1979 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. Automated assembly and testing of LED display modules was a significant technical accomplishment in FY 1980. LED module producibility at an affordable cost was established. All the subsystem components of the Laser display prototype were designed and fabricated in FY 1980. Program actions for the TCS/TCT included initiation and continuation of contracts for engineering development hardware and Integrated Logistics Support (ILS). Development Testing (DT II), full communications testing at Ft. Huachuca, AZ, Maintenance Engineering Evaluation (MEE) and small group trials, all for both TCS and TCT have begun.

2. (U) FY 1981 Program: For the Position Location Reporting System (PLRS), engineering development will be completed. DT/OT II which will thoroughly test the Engineering Development system will be conducted. 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 started. For the TDS, it is planned to award a contract to Litton Data Systems in the second quarter FY 1981 for the design and fabrication of a one-meter-by-one-meter prototype LED display. In addition, either Teledyne or Hughes will be awarded a subcontract to build 1000 LED modules. The contract is scheduled for completion in 18 months. The Laser Display System prototype will be assembled and installed into an S-280 shelter and tested in FY 1981. For TCS/TCT, actions include completion of the hardware contract, acquisition of producibility Engineering Planning (PEP) Data, completion of the ILS contract, except for software programing on the USM-410 which continues, and completion of DT II, full communications testing and MEE.

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3. (U) FY 1982 Planned Program: For PLRS, 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 ASARC III review will be conducted and production will begin. For the TDS, full-scale development of either the Light Emitting Diode or Laser Display System will be initiated. It is planned to develop and fabricate a total of seven (7) engineering development models for DT/OT Testing. For TCS/TCT, software programming on the USM-410 will be completed, an initial production posture will be established, and transition phase will be initiated. A development acceptance in-process review (DEVA IPR) will be conducted.

4. (U) FY 1983 Planned Program: Development of skill performance aids for PLRS will continue. The PLRS test set militarization will be completed. For the TDS, full-scale development of either the LED or Laser Display System will be continued.

5. (U) Program to Completion: Skill Performance Aids for PLRS will be completed, and a follow-on evaluation will be conducted if required. Testing of the TDS prototypes will commence. Two models will be used for contractor and government testing (DT II) and three for OT II. An additional two will be subjected to life testing. The TDS will be tested and evaluated as a candidate item for the Advanced Field Artillery Tactical Data System. It will also be tested as an automated assist to the TOC G3.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

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

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, enhance the Commander's ability to effectively control his maneuver elements as well as providing reliable navigation information to friendly forces. 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 (20 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 pre-designated 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 April 1981. The ASARC III review is scheduled for Second Quarter FY 1982, and the Initial Operational date is Fourth 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

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Project: #DC98
Program Element: #6.47.27.A
DOD Mission Area: #254 - Tactical Command
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Title: Position Location Reporting System (PLRS)
Title: Command and Control
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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). The Army is developing, through the use of a testbed, a PLRS/Joint Tactical Information Distribution System (JTIDS) hybrid under PE 6.37.13. 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, target acquisition and weapons systems that will be fielded in the 1986 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 1980 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 initiated to complete the contractor effort. Delivery of 2 master units and 64 user units is scheduled to begin in April 1981. 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. Contractor Prototype Qualification Tests were 80% completed. Frequency Propagation Tests were completed at Eglin Air Force Base, FL.

2. (U) FY 1981 Program: Preliminary Qualification Tests by the contractor (PQT-C) will be completed and Government DT II will begin with the delivery of two master units and 64 user units. DT II will be conducted and OT II will be started. DT II will be done at Ft Huchuca, AZ, and OT II will be done at Ft Hood, TX. The PM will issue the request for proposal for production.

3. (U) FY 1982 Planned Program: OT II will thoroughly test the Engineering Development system. The ASARC III review will be held in the second quarter. Automatic Test equipment software development will begin, and prototype refurbishment

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will be accomplished. Militarization of a PLRS portable test unit will be initiated. Support efforts will concentrate on production engineering and product assurance. Development of skill performance aids (SPA) will be started.

4. (U) FY 1983 Planned Program: Automatic test equipment will continue to be developed. Development of Skill Performance Aids (SPA) will continue and planning for follow-on evaluation will be completed. Automatic test equipment will conclude with a finished EQUATE program integration.

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:

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
Army Systems Acquisition Review Council Review	2nd Qtr FY82	1st Qtr FY82
Initial Operational Capability (IOC)	4th Qtr FY84	1st Qtr FY84

Slippage in IOC is the result of development problems encountered with flexible printed circuit boards during 4th Quarter FY80

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

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	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	10100	11129	9830	9564	6520	68039
Funds (as shown in FY 1981 submission)	8700	11968	9755	Not Shown	16089	67504
Quantities (current requirements)				2 Master Units		
Quantities (as shown in FY 1980 submission)				64 User Units		
					2 Master Units	
					64 User Units	

FY80 difference due to cost overrun on HAC identified to printed circuit board development. Difference in FY81 due to general Congressional reduction. Differences in FY82 are due to inflation. Differences in Additional To Complete and Total due to differences in what was required in FY80 and what was programed and inflation in 1982 and beyond. Development cost based on a validated baseline cost estimate and program performance history. If the program proceeds as planned, the cost estimate is felt to be valid.

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DOD Mission Area: #254 - Tactical Command
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Title: Position Location Reporting System (PLRS)
Title: Command and Control
Budget Activity: #4 - Tactical Programs

J. (U) Test and Evaluation Data

1. (U) Development Test and Evaluation:

a. (U) Development testing is being conducted in two phases. The first phase, Contractor Prototype Qualification Testing (PQT-C), begun in Jun 80 at Hughes Aircraft Corporation (HAC), Fullerton, California. PQT-C was designed to test the accuracy of the PLRS system, software performance, environmental conditioning, and human interface factors and obtain data for reliability, availability, and maintainability (RAM) analysis. The second phase, Government Developmental Test II (DT II), will be conducted at the Electronic Proving Ground (EPG), Fort Huachuca, Arizona, from Jan 81 to May 81. DT II will test PLRS performance in both an Electronic Warfare (EW) and non-EW environment, test logistic supportability, and expand human interface and RAM analysis. Although PLRS is not a major system, the system has been selected for review by the Director of Defense Test and Evaluation.

b. (U) The PLRS program is managed by the Project Manager, PLRS/TIDS, US Army Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ. The PM coordinates and integrate test activities as chairman of the PLRS Test Integration Working Group (TIWG). The PLRS independent DT evaluator is the US Army Materiel Systems Analysis Activity (AMSAA). The independent evaluators for the Joint Operational Test (OT) are the Marine Corps Operational and Evaluation Activity (MCOTEA) and the US Army Operational Test and Evaluation Agency (OTEA). Contractor PQT-C was coordinated through the TIWG using the Single Integrated Development Test Concept (SIDTC). The SIDTC permits use of contractor data to avoid duplication of testing by the Test and Evaluation Command (TECOM). DT II will be conducted at the US Army Electronic Proving Ground (USAEPG), Fort Huachuca, Arizona. USAEPG will conduct the test with assistance from PM PLRS/TIDS and the Electronic Warfare Laboratory. US Army and US Marine Corps personnel will provide direct support maintenance and Master Unit (MU)/User Unit (UU) operators. Plans call for 14 military maintenance personnel and 49 military operators. Army maintenance MOS 34P, USMC maintenance MOS 2884/2841, Army operator MOS's 72B, 74D, 35X and USMC operator MOS's 0311 and 2517 will be used. No specific MOS is specified for the UU operators.

c. (U) Major Test Milestones.

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Title: Position Location Reporting System (PLRS)

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Budget Activity: #4 - Tactical Programs

Event	Start	Complete
System Support Package	Nov 79	Nov 80
Prototype Qualification Test	Jun 80	Apr 81
Contractor (PQT-C)		
Government DT II	3rd Qtr 81	4th Qtr 81
DT II Analysis and Report	Jun 81	Feb 82

d. (U) Two master units (MU) and 64 user units (UU) will be tested during DT. This equipment is expected to be the same as that procured. User units will be tested while mounted in M60A1 tank, M113A1 personnel carrier, M114A1 Command and Reconnaissance carrier, M54A2 truck, OV-10 and OV-4 observation aircraft, OH-58 observation helicopter, and UH-60A and UH-1H utility helicopters. DT will provide data to assess whether the MU achieves an MTBMF of 100 hours and the UU achieves an MTBMF of 500 hours. If these values are not achieved during DT II, the system will go into a reliability improvement program to correct the deficiencies before entering OT. Environmental tests completed at HAC before system delivery to the government will include rain, wind analysis, vibration, shock, immersion, and temperature performance.

2. (U) Operational Test and Evaluation:

a. (U) Operational Test II (OT II) is planned as a two-phase joint Army/Marine Corps test which will ascertain the operational effectiveness of PLRS-equipped combat units having missions selected from Army/Marine Corps-developed mission statements. Test emphasis will be on the operational impact of PLRS on supported command and control elements, and on the utility of PLRS UU data to the assigned units. Mission Operational Effectiveness Statements (MOES) will be provided in the test support packages developed by the Training and Doctrine Command (TRADOC) and Marine Corps Development Center (MCDEC) in accordance with combat doctrine based upon a mid-intensity European conflict. The Marine Corps amphibious phase will be based on an exercise scenario which provides for amphibious assault and airborne operations as well as subsequent land campaign operations in a mid- to high-intensity, nonnuclear conflict. The PLRS will be employed to provide position and navigation information to commanders to allow for positioning and controlling units with particular emphasis on the peculiarities and dynamics of amphibious operations. The Army ground combat phase, conducted at Fort Hood, Texas, will be based upon the scenario provided by the Army Combat Developer (TRADOC) and will be representative of a mid-intensity European conflict. The PLRS will be employed in various divisional roles, to include support of an armored screening force, artillery, mechanized

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infantry, long-range patrols, and helicopter operations. The limited number of user units will require the test to be constructed as a series of separate, relatively small operations of specialized types rather than an integrated large-scale exercise. 2 Master Units and 64 User Units will be tested. The equipment is expected to be the same as the procured equipment.

b. (U) Test milestones are shown below:

Joint Operational Test II (OT II) Phase I (USA)	Oct 81	Dec 81
Joint Operational Test II, Phase 2 (USMC)	Jan 82	Feb 82
Joint OT II Analysis and Report	Sep 81	Feb 82
Joint Army/ Marine Corps SARC III		Mar 82
Arctic/Tropic Environmental Testing		To be determined
Follow-on Evaluation	Sep 84	Dec 84

c. (U) The MU will meet an MTBMF of 100 hours, and the UU will meet an MTBMF of 500 hours. Military maintenance personnel (MOS pending) will be used to maintain the system. Special maintenance equipment is listed below:

(U) Portable Test Unit. The Portable Test Unit is a multifunctional, digital data transmitter/receiver used for performing functional and performance tests on the User Unit and the Command and Response Unit, through a coaxial cable on RF link and the UU data input/output (I/O) devices. The PTU will also perform maintenance diagnostic testing of another PTU. Two Portable Test Units will be delivered with the PLRS EDM equipment for evaluation during DT/OT II. A waiver has been granted concerning militarization of the PTU during EDM.

(U) Maintenance Shelter. The AN/ASM-146B(XC) is the maintenance shelter which will be used to evaluate the maintenance concept during DT/OT II. It will be transported via the M35A2 2 1/2-ton truck during testing and will be referred to as the Direct Support Team Vehicle (DSTV). The DSTV will be furnished with the necessary test equipment, spare parts, secure container (safe), storage capability and work space which is required to perform maintenance through direct support (intermediate level). One shelter will be provided for DT/OT II. The shelter is Government-Leased Equipment (GLE) and will not undergo intentional destructive testing.

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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

3. (U) System Characteristics: Testing objectives for the 1981 DT II/OT II are given below:

a. (U) Mission Requirement Supporting Features

Position location	TOA measurements and multi- lateration
Ability to function in EW environment, and low proba- bility of intercept	Pseudo-noise and frequency- hopping spread spectrum signal, relay capability, adaptive net configuration, error detection and correction, and bit inter- leaved codes
Network survivability	Relay capability, adaptive routing
Communications security	Limited digital data message communications
Communications security	Secure data units

b. (U) Required Technical Characteristics

<u>Item</u>	<u>Description</u>	<u>Objective</u>
Weight	Manpack Configuration	Not to exceed 5 to 20 pounds
Size	Manpack Configuration	Not to exceed 300 to 500 cubic inches
Transportability	Master Station shall be	No damage shall occur

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Project: #nC98

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

Item	Description	Objective
	transportable by air, highway, and water	
Update Rate (Marine Amph Bde)	Use: Manpack Units Surface Vehicle Units Rotary-Wing Airborne Units Fixed-Wing Airborne Units	7 1/3 units/sec 3 2/3 units/sec 11 units/sec 20 units/sec
Update Period	Use: Manpack Units Surface Vehicle Units Rotary-Wing Airborne Units Fixed-Wing Airborne Units	10 seconds 15 seconds 5 seconds 2 seconds
Accuracy	Use: Manuever Elements Artillery Positioning Target Location and Surveillance	20-100 meters 20-30 meters 10-50 meters

c. (U) Required Operational Characteristics

Characteristic	Requirement
Determine Position	Trilateration or multilateration shall provide position solution to three dimensional space
Position Information	UTM or UPS coordinates shall be disseminated and correlated to geodetic coordinates

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<u>Characteristic</u>	<u>Requirement</u>
Static Baselines	Three distinct reference points will be used to correlate the PLRS grid to the geodetic grid
Dynamic Baselines	Position of known reference units must be continuously updated and reported to the MS
Line-of-Sight	UU's (either surface or airborne) shall be employed as integral relays

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FY 1982 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 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 Tactical Computer Terminal (TCT) fulfills a universal need for a basic, intelligent input/output device for receipt, review, and distribution of tactical information. The TCS/TCT will be the equipment used for the maneuver control portion of the Force Level and Maneuver Control System, SIGMA, being developed under Program Element 2.37.40.A, D484, Force Level and Maneuver Control System. The Army assimilated development of the TCS/TCT as components of the Tactical Operations System (TOS). When TOS was denied authorization, without prejudice, in FY 1980, the Army notified the Congress that this project would continue and subsequently received approval of a \$9.0 million Congressional reprogramming to support development in FY 1980. The need for a standard set of fully qualified automated data processing 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 is seeking to capitalize on this by making this equipment 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 permits 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 system requirements as well as longer range adaptability to emerging Military Computer Family (MCF) equipment. To this end, a code generator for the ADA compiler is being developed for the TCS. 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 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.

B. (U) RELATED ACTIVITIES: The initial maneuver control capabilities have been fielded in Europe using Engineering Development Models. The support of this effort is funded under Program Element 2.37.40.A, D484, Force Level and Maneuver Control System.

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

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Project: #D18:

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

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: 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) contract. In February 1979, a separate hardware contract, Fixed Price Incentive Fee (FPIF), was awarded for the engineering development hardware. Development testing (DT II) commenced on TCS/TCT at Ft Huachuca during the latter half of FY80, as well as full communications testing. Maintenance Engineering Evaluation (MEE) and small group trials for TCS/TCT were initiated. Software programming on the USM-410, the general support automatic test equipment, was begun as part of the ILS contract.

2. (U) FY 1981 Program: Engineering development hardware effort will be completed, to include the acquisition of productivity engineering planning (PEP) data. The ILS contract will be completed except for the software programming on the USM-410, which continues. TCS/TCT development testing will be completed, and full communications testing of the TCS/TCT at Ft Huachuca, AZ, will be completed. The MEE and the large group trials will be completed.

3. (U) FY 1982 Planned Program: Software programming on the USM-410 will be completed, an initial production posture will be established, and the transition phase will be initiated. A Development Acceptance In-Process Review (DEVA-IPR) will be conducted in the first quarter FY 1982.

4. (U) FY 1983 Planned Program: None.

5. (U) Program to Completion: None.

6. (U) Major Milestones:

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
Development Acceptance (DEVA)	1QFY1982	N/A
In-Process Review		

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Project: #0184

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

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
RDTE						
Funds (current requirements)	9000	7389	2523	0	0	18912
Funds (as shown in FY 1981 submission)	9000	7936	2421	0	0	19357

The decreases in FY 1981 is due to a general reduction by Congress. The increase in FY 1982 is due to application of higher inflation pricing indices than were applied last year. The Army has high confidence that the program will be completed within the total cost estimate.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.30.A

Title: Remotely Piloted Vehicles (RPV's)

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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	49341	54670	73348	34329	22607	252854
0040	Remotely Piloted Vehicle	49341	54670	58348	19846	0	200764
0041	Mission Payloads	0	0	15000	14493	22607	52090

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. The FSED of a night sensor, Forward Looking Infrared Sensor (FLIR), will fill the requirement to increase the effectiveness of the RPV system by adding a full night capability as well as augmented day capability to operate when degraded visibility and atmospheric conditions exist. 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 increasing the effectiveness of ammunition expended per target, the RPV assists in overcoming the numerical superiority of a potential enemy.

C. (U) BASIS FOR FY 1982 RDTE REQUEST:

1. (U) Funds requested provide for the third year of a 52-month FSED program for a daylight target acquisition designation and reconnaissance RPV System. Separate contracts were awarded for the RPV System and the associated anti-jam data link.

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

The data link is funded under P.E. #6.47.05.A, Modular Integrated Communication and Navigation System (MICNS). Prior to FY82, the MICNS Engineering Development Program was funded from P.E. 6.47.48.A, Standoff Target Acquisition System (SOTAS), this P.E., and P.E. 6.47.42.F, Location and Strike System (PLSS). In-house support will include monitoring contractor performance using design reviews and controlling cost, technical work, and schedule.

2. (U) The Army elected within its program prioritization to partially offset the RPV cost growth by deferring the start of the FLIR mission payload development to FY83. The original relative time phasing of RPV and FLIR remains the same.

3. (U) The validity of the total development estimate for FY82 is based on the RPV Baseline Cost Estimate (BCE) which is in turn based on Government engineering estimates and actual negotiated contract prices with the prime contractor and its subcontractors.

Project	Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
	1st Flight of Prototype	3Q CY 81	3Q CY 81
D040	DT Testing	3Q CY 83	4Q CY 82
	Production Award	4Q CY 83	2Q CY 83

The last two milestones differ from those provided in the FY 1981 submission because the FSED phase was restructured in December 1980 from a 43-month to a 52-month effort. Two factors contributed to this nine-month slip in schedule. One was the schedule slippage associated with the MICNS development upon which the RPV program depends, and the second was due to underestimated costs in the RPV program. Because of this funding shortfall, coupled with the development problem with MICNS, it was decided to cap the program at FY81 funding levels which resulted in a corresponding stretchout in the program.

Project D041	FSED Contract Award	2Q CY 82	N/A
	DT/OT II Completed	2Q CY 84	N/A
	Development IPR	3Q CY 84	N/A
	Production Contract Award	3Q CY 84	N/A

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Program Element: #6.47.10.A

Title: Remotely Piloted Vehicles (RPV's)

DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance
and Target Acquisition

Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	49341	54670	73348	56936	252854
Funds (as shown in FY 1981 submission)	49341	54189	62350	Continuing	Not Applicable

The FY81 increase was due to inflation. Due to design complexity, both prime and subcontractors underestimated costs to complete the basic RPV program. This created a need for additional funds in FY82 and the outyears.

E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands) Procurement planned to start in FY 1984 funded in Other Procurement, Army (OPA) Appropriation.

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Program Element: #6.47.30.A

Title: Remotely Piloted Vehicles (RPV's)

DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance
and Target Acquisition

Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The program will accomplish the Full-Scale Engineering Development (FSED) of the RPV System begun in FY 1979 and the FLIR planned to start in FY 1982. The RPV System will fill the requirement for unmanned aerial target acquisition, target designation and location. 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 system is required to extend the eyes of Brigade and Division combat elements to the range of their direct support artillery weapons where, during combat, ground-based systems cannot see and the risk to manned observation aircraft is high. This system multiplies the effectiveness of field artillery and assists the commander to optimally employ his forces by providing artillery adjustment and laser designation on targets at the full range of the field artillery. The RPV assists in overcoming the numerical superiority of a potential enemy and enhancing the field artillery's ability to destroy enemy tanks and other targets beyond ground line of sight. The FLIR sensor development will fill the requirement of a night sensor for the RPV to provide night and limited all-weather capability of target acquisition, laser designation for laser-seeking weapons, target location, artillery adjustment and battlefield reconnaissance.

G. (U) RELATED ACTIVITIES:

PROJECT #D040: (U) 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 radio relay, Meteorological, etc., will continue under these two PE's. The Air Force RPV programs consisting of PE 6.37.39.F, Advanced RPV's, and PE 6.47.46.F, Expendable Drones, are being monitored to utilize applicable technology, as appropriate. The Marine Corps has adopted the Army's Required Operational Capability (ROC) document, and the Army Program is being coordinated with them. The Army, Air Force, and Navy program managers and Marine Corps Liaison officer meet to preclude duplication of effort between the services. The Data link is funded under P.E. 6.47.05.A, Modular Integrated Communication and Navigation System (MICS). Prior to FY82 the MICS engineering development program was funded from P.E. 6.47.48.A, Standoff Target Acquisition System (SOTAS), this P.E., and P.E. 6.47.32.F, Precision Location and Strike System (PLSS).

PROJECT #D041: (U) The FLIR sensor development is being funded during Exploratory Development and Advanced Development by PE 6.27.32A, Remotely Piloted Vehicle Supporting Technology, and 6.37.25, Remotely Piloted Vehicles. There is no unnecessary duplication of this effort within the Army or the Department of Defense.

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

II. (U) WORK PERFORMED BY:

PROJECT #D040: (U) US 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 Laboratories, 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, Ft. 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 Navigation and Control System (MICNS-anti-jam data link).

PROJECT #D041: (U) US Army Aviation Research and Development Command, St. Louis, MO. Night Vision and Electro-Optics Laboratory, US Army Electronic Research and Development Command, Fort Belvoir, VA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments:

Project #D040: (U) The full-scale engineering development (FSED) program started in FY 1979, following the successful Systems Technology Demonstrator (STD) program accomplished under PE 6.37.25.A Remotely Piloted Vehicles/Drones, from FY 1975 through 1978. The Integrated Communications Navigation System (ICNS), an anti-jam data link, was flight tested in FY 1978 in a manned aircraft and during the STD. By the beginning of FY 1979, all necessary preengineering development work was completed for a daylight, target acquisition, laser designation and reconnaissance system. A separate contract for the data link, the Modular Integrated Communication and Navigation System (MICNS), was awarded 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 fabricating 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 current FSED program is for a period of 52 months. Preliminary design of hardware and software is continuing. Preliminary Design Review (PDR) and subsystem Critical Design Reviews (CDR) were started. In addition, mockups have been constructed and mockup reviews were completed.

PROJECT #D041: (U) Not applicable to 6.47.30A.

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

2. (U) FY 1981 Program:

PROJECT #0040: (U) Continue the FSED program initiated in FY 1979. Initiate testing of components and subsystems. Complete design of hardware and software. Continue system 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 first flight of the system in late FY 1981 will mark the beginning of Developer total system testing which will continue into FY 1983.

PROJECT #0041: (U) This program will accomplish the Full-Scale Engineering Development (FSED) for the Remotely Piloted Vehicle (RPV) system with FLIR. The RPV day system was approved for entry into FSED in FY 1978. Contingent upon this approval, was the requirement that a FLIR sensor be developed to be deployed subsequent to the fielding of the Day RPV System. All necessary experimental work required before moving into full-scale engineering development of the FLIR Program will be completed under program element 6.37.25, Remotely Piloted Vehicles Drones.

3. (U) FY 1982 Planned Program:

PROJECT #0040: (U) Integrate and test RPV system using the system mockups. Initiate MICNS integration. Start manned aircraft flight tests using MICNS. Conduct first flight of the RPV using MICNS. Complete software specifications and design validation for total RPV system. Initiate hardware qualification tests using MICNS. Training and maintenance requirements will be established preparatory to operational testing in FY 1983.

PROJECT #0041: (U) The FLIR Program is a new engineering development program starting in FY 1982. The FSED contract will be awarded in April 1982. The contractor will be required to design and fabricate five FLIR payloads to be integrated into the RPV System and will be fielded interchangeably with the daylight sensor payloads. This initial capability will provide day/night/limited adverse weather capability to the RPV System.

The contractor will be competitively selected for FSED. Full-Scale Engineering Development will not begin until FY 1982.

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Program Element: #6.17.30.A Title: Remotely Piloted Vehicles (RPV's)
DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance and Target Acquisition Budget Activity: #4 - Tactical Programs

4. (U) FY 1983 Planned Program:

PROJECT #D030: (U) The FSED program will continue into FY 1983. Contractor tests will be completed. Government DT II and OT II will be initiated and completed.

PROJECT #D031: (U) The FLIR FSED Program will continue into FY 1983. FLIR will be made compatible with the day system already in FSED. The five prototype units will be delivered, and checkout of the interface will begin. Contractor testing will be initiated. The program will be monitored technically by a team of engineers who will be drawn from various government laboratories.

5. (U) Program to Completion:

PROJECT #D040: (U) Analysis of DT II and OT II test results will be completed. ASARC/DSARC III will be conducted. A production decision is contemplated late in the 1st Quarter of FY 1984.

PROJECT #D041: (U) The FLIR FSED Program will continue into FY 1984. Contractor testing will be completed and the system fully integrated with the RPV system. DT/OT II will be completed by 3rd Quarter FY 1984, and a production contract will be awarded in the 4th Quarter of FY 1984.

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Program Element: #6.47.30.A

Title: Remotely Piloted Vehicles (RPV's)

DDO Mission Area: #255 - Tactical Surveillance, Reconnaissance
and Target Acquisition

Budget Activity: #4 - Tactical Programs

1. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (U) Development tests were conducted July-November 1977 at the US Army Electronic Proving Ground, Fort Huachuca, Arizona, using the Aquila Advanced Development hardware. Data was collected and analyzed on the following:

- (1) (U) Technical performance characteristics of the RPV system.
- (2) (U) Ability of the RPV to be navigated to and from an area.
- (3) (U) Ability of the RPV to detect, locate, recognize, and identify targets.
- (4) (U) Health and safety hazards when operating the RPV system.
- (5) (U) Reliability, availability, and maintainability (RAM) characteristics of the RPV system.
- (6) (U) Performance characteristics of the launch and recovery system.

During the test, military personnel operated the system and performed organizational maintenance. Contractor personnel performed all maintenance beyond organization level.

b. (U) The following is a summary of the development test results:

(1) Technical Performance. The RPV generally performed satisfactorily to ranges and altitudes in excess of the design specifications of 20 kilometers and 12,000 ft. above mean sea level. The system's worst case position location error for the air vehicle location was 150.7m at 20 km ground system to air vehicle range. This was caused by antenna misalignment and will be corrected to within in the FSED models. The mean altitude error was 7m. The RPV followed the programmed flight path with a mean guidance error (depending on flight direction) of from 3 to 45m with one Ground Control Station (GCS) and from 1 to 31.1m with the other GCS. Errors were due to weak signals when the RPV antenna was turned away from the GCS and to errors in tracking in the GCS antenna system. These difficulties will be corrected in the engineering development models.

Program Element: #6.47.30.A

Title: Remotely Piloted Vehicles (RPV's)

DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance
and Target Acquisition

Budget Activity: #4 - Tactical Programs

(2) (U) Sensor Performance.

(a) (U) With the stabilized TV camera with autotracking capability, 73.9 percent of the open area targets were detected and 50.0 percent of the cluttered area targets were detected. Of the detected targets, 79.1 percent were correctly identified. The average detection slant range was 3862 ft.

(b) (U) The mean error in the LASER rangefinder averaged position readout was 161.3m at 17km.

(3) (U) Health and Safety. Health and safety precautions required that exposed personnel be protected during launch (ears) and laser operations (eyes).

(4) (U) Reliability, availability, and maintainability. The reliability and availability of the air vehicle and the stabilized TV camera with boresighted laser rangefinder/target designator were considerably lower than the other components of the system. Organizational maintenance was not authorized on the sensors or the Ground Control Station electronics.

(5) (U) Launch and Recovery Systems. Performance of the launch and recovery systems was adequate.

c. (U) The AQUILA, referred to as the RPV system, is a lightweight, unmanned, airborne system which provides real or near-realtime reconnaissance, target acquisition, conventional artillery adjustment, and laser designation. This RPV system was designated a System Technology Demonstrator. It was not designed or intended to be a fieldable militarized system.

(1) (U) The RPV system consists of four major subsystems plus ancillary support equipment. The subsystems are:

(a) (U) Remotely piloted air vehicle.

(b) (U) Ground control station (GCS).

(c) (U) Launcher.

(d) (U) Retrieval assembly.

Program Element: 06.47.30.A

Title: Remotely Piloted Vehicles (RPV's)

DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance and Target Acquisition

Budget Activity: #4 - Tactical Programs

(2) (U) The RPV is guided and tracked from the GCS. Control commands are processed through a computer in the GCS and transmitted via a radio data link. TV sensor data and RPV telemetry data are returned by a second data link. The GCS is equipped with TV displays and video tape recording equipment. Launching of the aircraft is achieved by a truck-mounted pneumatic catapult. Recovery is achieved by the use of a vertical net/horizontal strap retrieval assembly.

(3) (U) The system includes a preprogramable flight path control capability to include the following modes:

(a) (U) Waypoint navigation.

(b) (U) Repetitive search.

(c) (U) Loiter/orbit.

(d) (U) Ascend/level-off.

(e) (U) Visual landing approach/recovery.

(f) (U) Link loss maneuver.

The operator can also use the manual control system, overriding the automatic control.

(4) (U) The system was provided with the following sensor payloads:

(a) (U) Stabilized TV camera with autotracking capability.

(b) (U) Stabilized TV camera with boresighted laser rangefinder/target designator.

d. (U) The full-scale engineering development hardware will include the following features:

(1) (U) A hardened system designed to sustain the rigors of combat.

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

(2) (U) Stringent reliability, availability, and maintainability requirements.

(3) (U) An anti-jam data link.

(4) (U) Tighter accuracy specifications.

(5) An increase in range of the system out to

(e) (U) Development Tests II (DT II) are scheduled for Jan-Jul 1983 and will be conducted at Fort Bliss, Texas.

2. (U) Operational Test and Evaluation:

a. (U) In conjunction with the development tests at Fort Huachuca, Arizona, July-November 1977, the U.S. Army Field Artillery Board conducted Force Development Testing Experimentation (FDTE) of the RPV. The following were FDTE test objectives:

(1) (U) To assess the ability of the RPV system to conduct daytime-only reconnaissance, target acquisition, artillery adjustment and laser designation.

(2) (U) To identify the organizational and operational requirements for employment of the RPV system. During the test, military personnel operated the system and performed organizational maintenance.

(b) (U) During the conduct of FDTE, 47 RPV launches were accomplished resulting in 39 flights completed in which the target acquisition mission could be conducted. Three RPV's were crashed. The system demonstrated the capability of the concept for an unmanned aerial vehicle to navigate to an area of interest up to 20km from the launch site, to detect and camouflage targets of potential military significance, and to return to the recovery site.

(c) (U) The RPV system detected and located approximately 62 percent of the targets it overflew. Both single and multiple vehicle targets in the proximity of terrain clutter were more difficult to detect than targets in the open.

Program Element: #6.47.30.A

Title: Remotely Piloted Vehicles (RPV's)

DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance
and Target Acquisition

Budget Activity: #4 - Tactical Program

(d) (U) Targets were engaged with artillery using the RPV and standard adjustment techniques.

(e) (U) The RPV system automatically tracked approximately 63 percent of the targets selected for simulated engagement with a terminally guided laser homing artillery projectile. Targets of high contrast to background terrain could be tracked adequately; targets of low contrast could not be adequately tracked for designation.

f. (U) An anti-jam data link was tested at Ft. Huachuca, January-February 1978. Attempts were made to jam the Harris Corporation technology demonstrator which is the Integrated Communications Navigation System (ICNS). The ICNS was carried by both a manned aircraft and the RPV. Attempts to jam the video link were not successful.

g. (U) Survivability testing was conducted at Ft. Bliss, Texas, February-March 1978. The RPV was engaged by anti-aircraft guns and survived the engagements.

h. (U) In March 1978 at White Sands Missile Range, the RPV successfully designated for the Copperhead round. A direct hit was scored on the target tank.

i. (U) The full-scale engineering development models will undergo operational testing at Ft. Hood, Texas, August-September 1983. The Operational Test and Evaluation Agency will perform this independent evaluation.

3. (U) System Characteristics:

<u>Operational/Technical Characteristics</u>	<u>Objectives</u>	<u>Demonstrated Performance</u>
Range GCS to air vehicle		
Range vehicle to target		
a. Detection on road/off road		
b. Recognition		

Program Element: #6.17.30.A

Title: Remotely Piloted Vehicles (RPV's)

DOD Mission Area: #255 - Tactical Surveillance, Reconnaissance
and Target Acquisition

Budget Activity: #4 - Tactical Programs

<u>Operational/Technical Characteristics</u>	<u>Objectives</u>	<u>Demonstrated Performance</u>
c. Identification		
d. Designation		
Accuracy (CEP) at		
Emplacement/Displacement		
Survivability	Survive A/A guns and Heat-Seeking Missiles	Survived A/A guns
Minimum radar and IR Signatures	-	N/A
Anti-jam data link	Heat Seeking Missiles do not lock-on.	
Nuclear, Ballistic, Chemical	Not Jammable	Not Jammable
Hardening	MILSPEC	N/A
Endurance of no less than	3 hrs	3 hrs
Altitude	12000 ft	12000 ft

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # D040

Program Element: # 6.47.3A

DOD Mission Area: #255 - Tactical Surveillance,
Reconnaissance and Target Acquisition

Title: Remotely Piloted Vehicles (RPVs)

Title: Remotely Piloted Vehicles (RPVs)

Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: 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 designation and location. 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 system is required to extend the eyes of Brigade and Division combat elements to the range of their direct support artillery weapons where, during combat, ground-based systems cannot see and the risk to manned observation aircraft is high. This system multiplies the effectiveness of field artillery and assists the commander to optimally employ his forces by providing artillery adjustment and laser designation on targets at the full range of the field artillery. The RPV assists in overcoming the numerical superiority of a potential enemy by enhancing the field artillery's ability to destroy enemy tanks and other targets beyond ground line of sight.

B. (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 radio relay, meteorological, etc., will continue under these two PE's. The Air Force RPV programs consisting of PE 6.37.39.V, Advanced RPV's, and PE 6.47.46.F, Expendable Drones, are being monitored to utilize applicable technology, as appropriate. The Marine Corps has adopted the Army's Required Operational Capability (ROC) document, and the Army Program is being coordinated with them. The Army, Air Force, and Navy program managers and Marine Corps Liaison Officer meet to preclude duplication of effort between the services. The data link is funded under P.E. 6.47.05.A, Modular Integrated Communication and Navigation System (MICNS). Prior to FY82, the MICNS Engineering Development Program was funded from P.E. 6.47.48.A, Standoff Target Acquisition System (SOTAS), this P.E., and P.E. 6.47.32.F, Precision Location and Strike System (PLSS).

C. (U) WORK PERFORMED BY: US 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 Electron-Optics Laboratories, 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 Missile and Space Company, Sunnyvale, CA, for system development and to Harris Corporation, Melbourne, FL, for the Modular Integrated Navigation and Control System (MICNS-antijam data link).

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Project: # D040

Program Element: # 6.47.00A

DOD Mission Area: #255 - Tactical Surveillance,
Reconnaissance and Target Acquisition

Title: Remotely Piloted Vehicles (RPVs)

Title: Remotely Piloted Vehicles (RPVs)

Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: The full-scale engineering development (FSED) program started in FY 1979, following the successful Systems Technology Demonstrator (STD) program accomplished under PE 6.37.25.A, Remotely Piloted Vehicles/Drones, from FY 1975 through 1978. An antiJam data link, the Integrated Communications Navigation System (ICNS), was flight tested in FY 1978 in a manned aircraft and during the STD. By the beginning of FY 1979, all necessary preengineering development work was completed for a daylight, target acquisition, laser designation and reconnaissance system. A separate contract for the data link, the Modular Integrated Communication and Navigation System (MICNS) was awarded 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 fabricating of 22 air vehicles, 4 ground control stations, 1 launch and recovery systems, and 18 daylight sensor systems. The contractor began design and engineering late in FY 1979. The current FSED program is for a period of 52 months. Preliminary design of hardware and software are continuing. Preliminary Design Review (PDR) and subsystem Critical Design Reviews (CDR) were started. In addition, mockups have been constructed and mockup reviews were completed.

2. (U) FY 1981 Program: Continue the FSED program initiated in FY 1979. Initiate testing of components and systems. Complete design of hardware and software. Continue system 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 into FY 1983.

3. (U) FY 1982 Planned Program: Integrate and test RPV System using the system mock-ups. Initiate MICNS integration. Start manned aircraft tests using MICNS. Conduct first flight of the RPV using MICNS. Complete software specifications and design validation for total RPV system. Initiate hardware qualification tests using MICNS. Training and maintenance requirements will be established preparatory to operational testing in FY 1983.

4. (U) FY 1983 Planned Program: The FSED program will continue into FY 1983. Contractor tests will be completed. Government DT II and OT II will be initiated and completed.

5. (U) Program to Completion: Analysis of DT II and OT II test results will be completed. ASARC/DSARC II will be conducted. A production decision is contemplated late in the 1st Quarter of FY 1984.

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Project: # 00940

Title: Mission Payloads

Program Element: # 0.47.00A

Title: Remotely Piloted Vehicles (RPVs)

DDO Mission Area: #255 - Tactical Surveillance,

Budget Activity: #4 - Tactical Programs

Reconnaissance and Target Acquisition

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
1st Flight of Prototype	3Q CY 81	3Q CY 81
OT Testing	3Q CY 83	4Q CY 82
Production Award	4Q CY 83	2Q CY 83

The last two milestones differ from those provided in the FY 1981 submission because the FSED phase was restructured in December 1980 from a 43-month to a 52-month effort. A major contributing factor to the program restructuring has been the schedule slip associated with the MICNS development upon which the RPV program depends. The slip will not affect the first milestone which is still planned to occur as previously scheduled.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	49341	54670	58348	19846	0	200764
Funds (as shown in FY 1981 submission)	49341	54189	44487	N/A	13060	179676
Quantities (current requirements)	-	-	-	-	-	22 Air Vehicles 4 Ground Control Stations 3 Launch Systems 3 Recovery Systems 18 Daylight Sensor
Quantities (as shown in FY 1981 submission)	-	-	-	-	-	Same as current requirements

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Project: # D040

Title: Mission Payloads

Program Element: # 6.47.30A

Title: Remotely Piloted Vehicles (RPVs)

DOD Mission Area: #255 - Tactical Surveillance,
Reconnaissance and Target Acquisition

Budget Activity: #4 - Tactical Programs

The FY81 increase was due to inflation. Due to design complexity, both prime and subcontractors underestimated costs to complete the basic RPV program. This created a need for additional funds in FY82 and the outyears.

Other Appropriations: Procurement planned to start in FY 1984 funded in Other Procurement, Army (OPA) Appropriations.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # D041 Title: Mission Payloads
Program Element: # 6.47.30A Title: Remotely Piloted Vehicles (RPVs)
DOD Mission Area: #255 - Tactical Surveillance Budget Activity: #4 - Tactical Programs
Reconnaissance and Target Acquisition

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The program provides for Full-Scale Engineering Development (FSED) of a night sensor (Forward Looking Infrared Sensor - FLIR) for the Remotely Piloted Vehicle (RPV) to fill the requirement for night, limited adverse weather capability. This capability will include target acquisition, laser designation for laser seeking weapons, target location, artillery adjustment and battlefield reconnaissance. This FLIR sensor will operate effectively during daylight hours when degraded visibility conditions exist. These systems will increase the effectiveness of the RPV system by adding a full night capability as well as an augmented day capability.

B. (U) RELATED ACTIVITIES: The FLIR sensor development is being funded during Exploratory Development and Advanced Development by PE 6.27.32A, Remotely Piloted Vehicle Supporting Technology, and PE 6.37.25, Remotely Piloted Vehicles.

C. (U) WORK PERFORMED BY: US Army Aviation Research and Development Command, St. Louis, MO.
Night Vision and Electro-Optics Laboratory, US Army Electronic Research and Development Command, Fort Belvoir, VA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Not applicable to PE 6.47.30A.

2. (U) FY 1981 Program: This program will accomplish the Full-Scale Engineering Development (FSED) for the Remotely Piloted Vehicle (RPV) system with FLIR. The RPV day system was approved for entry into FSED in FY 1978. Contingent upon this approval was the requirement that a FLIR sensor be developed to be deployed subsequent to the fielding of the day RPV system. All necessary experimental work required before moving into full-scale engineering development of the FLIR Program will be completed under Program Element 6.37.25A, Supporting Technology. The contractor will be competitively selected for FSED. Full-Scale Engineering Development will not begin until FY 1982.

3. (U) FY 1982 Planned Program: The FLIR Program is a new engineering development program starting in FY 1982. The FSED contract will be awarded in April 1982. The contractor will be required to design and fabricate five FLIR payloads to be integrated into the RPV system and will be field-interchangeable with the daylight sensor payloads. This initial capability will provide day/night/limited adverse weather capability to the RPV system.

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Project: # D041

Title: Mission Payloads

Program Element: # 6.47.30A

Title: Remotely Piloted Vehicles (RPVs)

DOD Mission Area: #255 - Tactical Surveillance

Budget Activity: #6 - Tactical Programs

Reconnaissance and Target Acquisition

4. (U) FY 1983 Planned Program: The FLIR FSED program will continue into FY 1983. FLIR will be made compatible with the day TV system already in FSED. The five prototype units will be delivered, and checkout of the interface will begin. Contractor testing will be initiated. The program will be monitored technically by a team of engineers who will be drawn from various government laboratories.

5. (U) Program to Completion: The FLIR FSED program will continue into FY 1984. Contractor testing will be completed and the system fully integrated with the RPV system. DT/OT II will be completed by 3rd Quarter FY 1984, and a production contract will be awarded in the 4th Quarter of FY 1984.

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
FSED Contract Award	2Q CY 82	N/A
DT/OT II Completed	2Q CY 84	N/A
Development IPR	3Q CY 84	N/A
Production Contract Award	3Q CY 84	N/A

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	-	-	15000	14483	22607	52090
Funds (as shown in FY 1981 submission)	-	-	17863	Continuing	Continuing	TBD
Quantities (current requirements)	-	-	-	-	-	5
Quantities (as shown in FY 1981 submission)	-	-	-	-	-	Not Shown

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Project: # D041

Title: Mission Payloads

Program Element: # 6.47.30A

Title: Remotely Piloted Vehicles (RPVs)

DOD Mission Area: #255 - Tactical Surveillance

Budget Activity: #4 - Tactical Programs

Reconnaissance and Target Acquisition

The decrease between the FY 1981 and the FY 1982 submission results from a refined project cost estimate submitted by Night Vision Laboratory in February 1980 which considered a later FSED start than planned when the FY 1981 submission was made.

Other Appropriations: N/A

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
TOTAL FOR PROGRAM ELEMENT		2201	3432			Continuing	Not Applicable
QUANTITIES							Not Applicable
D662	Tactical Surveillance System	2201	3432			Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element supports the portion of the Army's Tactical Exploitation of National Capabilities (TENCAP) program engineering development (ED) work which is directed toward developing a tactical support system to receive, process, and disseminate intelligence/information from multiple sources which locates enemy units, activity, and targets representing a general tactical threat. Systems developed will be the primary source of intelligence on enemy second-echelon forces. Such intelligence/information is essential to the tactical commander to enable him to fight and win while outnumbered in a high-intensity conflict. The tactical commander must have the capability to locate, identify, engage, and attrite superior 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. In the TENCAP Program, advanced techniques are applied to exploit information collected from a variety of nationally controlled sensors which, in general, is not otherwise obtainable, and then provide that information to the tactical command and control environment in a sufficiently timely and useful form to greatly assist the commander in defeating the enemy.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Develop interfaces necessary to receive, process, and exploit TR-1/Advanced Synthetic Aperture Radar System (TR-1/ASARS) data in conjunction with USAF. Test and evaluate processing and exploitation concepts in conjunction with tactical exercises and Digital Imagery Test Bed Demonstrations.

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. COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	2201	3432		Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	2201	8036		Continuing	Not Applicable

(U) The FY 1981 change is based on Congressional action on the FY81 budget. Congress reduced funding for the engineering development of the TacIES system with direction to bring the Army and Air Force efforts in line and eliminate duplication of efforts and costs. The FY 1982 change is due to a slippage in the Air Force TR-1 program and subsequent reduction in Army interface development efforts.

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

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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: Data originating from a variety of strategic and tactical surveillance sensors must be transmitted to central collection points where the data can be processed and analyzed. The resulting tactical intelligence must then be rapidly disseminated and fused into the command and control environment in such a timely and useful form as to materially influence the land battle. Techniques and equipment which will provide for this rapid receipt, processing, and dissemination of intelligence data are being developed under this program.

G. (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, 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) 6.17.30.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; Aerospace Corp., El Segundo, CA; Ford Aerospace Corp., Palo Alto, CA; US Army Communication Development and Readiness Command (CORADCON), Fort Monmouth, NJ; DBA, Inc., Melbourne, FL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Hardware/software interfaces with tactical processing systems were developed. Communications and support was provided to the Digital Imagery Test Bed (DITB) for deployment during Reforger 1980. The DITB was deployed and operated during fall 1980 in support of Reforger exercise Certain Rumpart. Initial studies regarding interfaces with TR-1/ASARS were started; and a joint USA/USAF management plan for tactical exploitation of digital imagery data was begun.

2. (U) FY 1981 Program: Continue engineering development of hardware/software interfaces for receipt, correlation, and dissemination of data from new theater sensor systems. Begin engineering development of improved interfaces with the Interim Tactical ELINT Processor (ITEP) and emerging All-Source Analysis System (ASAS). Complete USA/USAF joint management plan. Support operational evaluations and demonstrations of concepts and provide limited support to XVIII Airborne Corps with the DITB.

3. (U) FY 1982 Planned Program: Continue development of improved communications and interfaces with the ITEP and emerging ASAS. Continue to test concepts, exploitation techniques, and software with the DITB in an operational envi-

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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

ronment. Develop software necessary to interface with TR-1/ASARS and integrate TR-1/ASARS data with data from other sensor sources. Continue to provide limited operational support to XVIII Airborne Corps and RDP-JTF with the DITB.

4. (U) FY 1983 Planned Program: Prototype TacIES will be deployed for operational evaluation. Integrated logistics planning and production engineering will begin for an operational TacIES.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

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

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4228	9250			Continuing	Not Applicable
	QUANTITIES						Not Applicable
D909	Tactical Electronic Surveillance Systems	4228	9250			Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element supports that portion of the Army's Tactical Exploitation of National Capabilities (TENCAP) program engineering development (ED) work which is directed toward developing a tactical support system to receive, process, and disseminate intelligence/information from multiple sources which locates enemy units, activity, and targets representing a general tactical threat. Systems developed will be the primary source of intelligence on enemy second-echelon forces. Such intelligence/information is essential to the tactical commander to enable him to fight and win while outnumbered in a high-intensity conflict. The tactical commander must have the capability to locate, identify, engage, and attrite superior 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. In the TENCAP Program, advanced techniques are applied to exploit information collected from a variety of nationally controlled sensors which, in general, is not otherwise obtainable, and then provide that information to the tactical command and control environment in a sufficiently timely and useful form to greatly assist the commander in defeating the enemy.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Continue Advanced Development work on hardware/software interfaces between existing and future strategic and theater sensor systems and Army Tactical exploitation systems; complete fabrication of additional Interim Tactical ELINT Processors (ITEPs). Perform Technical analysis of potential utility of developing strategic systems.

Program Element: #6.43.45.A Title: Tactical Electronic Support Measures Systems
 DOD Mission Area: #255 - Tactical Surveillance Budget Activity: #4 - Tactical Programs
 Reconnaissance & Target Acquisition

D. COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	4228	9250		Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4228	12996		Continuing	Not Applicable

(U) The decrease in FY 1981 is due to a Congressional Appropriation reduction. The increase in FY 1982 is due to additional funding necessary to complete the purchase of additional Interim Tactical ELINT Processors (ITEP's). Project D926 (All Source Analysis System) is now reported under PE 6.43.21.A (Joint Tactical Fusion Program).

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
Other Appropriations:						
Other Procurement, Army						
Funds (current requirements)	0	1800	2300		Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	0	1800	5200	-	Continuing	Not Applicable
Quantities (current requirements)					Not Applicable	Not Applicable

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

	FY 1980 <u>Actual</u>	FY 1981 <u>Estimate</u>	FY 1982 <u>Estimate</u>	FY 1983 <u>Estimate</u>	Additional <u>to Completion</u>	Total Estimated <u>Cost</u>
Quantities (as shown in FY 1981 submission)						Not Shown

Decrease in FY82 is due to delay in beginning procurement on the Tactical ELINT Processor (TEP) until mid-1980's.

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Program Element: 6.47.45.A

DDO Mission Area: 255 - Tactical Surveillance
Reconnaissance & Target Acquisition

Title: Tactical Electronic Support Measures Systems
Budget Activity: 34 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This project supports the Army's Tactical Exploitation of National Capabilities (TENCAP) program 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. The systems developed will be the primary source of intelligence on enemy second-echelon forces. 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 fused into the command and control environment in a timely and useful form so as to materially influence the land battle. Techniques and equipment which provide for this rapid receipt, processing, and dissemination of intelligence data are being developed under this program.

G. (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.

H. (U) WORK PERFORMED BY: Aerospace Corporation, El Segundo, CA; US Army Electronics Research and Development Command (ERADCOM), Adelphi, MD; US Army Communications Research and Development Command, Fort Monmouth, NJ; MRI, Inc., Fairfax, VA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Initiated fabrication and engineering development of two prototype Interim Tactical Electronic Intelligence (ELINT) Processing (ITEP) systems. Delivered the first ITEP to Europe, where it was immediately used in a tactical exercise. Delivered second ITEP to XVIII Airborne Corps. Both ITEP's completed DIA security accreditation and DCA Autodin certification testing and are providing excellent support to the two Army Corps. All necessary experimental work was completed under Program Element 6.37.45.A, D907, Tactical Electronic Surveillance System.

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Program Element: #6.47.45.A

Title: Tactical Electronic Support Measures Systems

DOD Mission Area: #255 - Tactical Surveillance

Budget Activity: #4 - Tactical Programs

Reconnaissance & Target Acquisition

2. (U) FY 1981 Program: Continue joint programs to improve strategic sensor interfaces to enhance tactical utility and reduce communications requirements. Complete hardware purchase and begin fabrication of first two additional Interim Tactical ELINT Processors (ITEP's) to provide an effective ELINT processing capability for each deployed Corps as soon as possible. (The FY81 ITEP purchase is dependent on approval of a reprogramming action.) Develop improved communications and interfaces with the Digital Imagery Testbed (DITS), the emerging All-Source Analysis System (ASAS), and the prototype Tactical Imagery Exploitation System (Tacies).
3. (U) FY 1982 Planned Program: Deploy the first two additional ITEP's in first/second quarter and complete fabrication of system three for deployment in early fourth quarter FY82. Continue joint programs to enhance tactical utility of strategic sensors. Continue development of communications and interfaces between ITEP, prototype Tacies, and ASAS. Perform technical analysis of potential utility of developing strategic sensors.
4. (U) FY 1983 Planned Program: Continue Interim Tactical ELINT Processor (ITEP) software improvements in response to user requirements and operational evaluations. Deploy fourth (final) ITEP. Begin implementation of interfaces with the prototype Tactical Imagery Exploitation System (Tacies) and emerging All Source Analysis System (ASAS). Continue joint programs to enhance the tactical utility of developing strategic sensor mix.
5. (U) Program to Completion: This is a continuing program.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.48.A

DOD Mission Area: #216 Land Combat Service Support

Title: Automatic Test Support System (ATSS)

Budget Activity: #4 Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	5997	9016	Continuing	Not Applicable
D516	ATSS Family	0	0	5997	9016	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Significant advances in technology and its applications to Army systems have created a requirement for an automatic test capability for performance testing and fault location. The planned fielding of more complex sophisticated weapon systems dictates the procurement of improved test equipment for fault detecting and location analysis. The current family of manual Test Measurement and Diagnostic Equipment and limited Automatic Test Equipment does not provide the capability to keep pace with the modernization efforts. The current capability is manpower intensive, relatively slow, and is often designed for only specific limited missions. Continuation of the current capability or increasing the density would not improve the situation or assist in obtaining increased weapon system operational availability. Automatic test capability forward of General Support is needed to insure the materiel readiness of new combat and combat support systems. To ensure adequate readiness, program managers have independently selected automatic test equipment to maintain their systems. This system-peculiar approach to selecting Automatic Test Equipment (ATE) has resulted in a proliferation of special purpose ATE. To effectively handle future maintenance problems with any type of standardized approach, it will be essential to develop standard criteria for terminology, specifications, and computer language use. This program element provides the engineering development funding for ATE below the general support level. Initial efforts are directed toward fielding of the simplified test equipment - expandable (STE-X) for organizational maintenance of combat vehicles and the Direct Support Automatic Test Support System (ATSS-DSS) for direct support electronic maintenance.

C. (U) BASIS FOR FY 1982 RDT&E REQUEST: Development of the Simplified Test Equipment-Expandable (STE-X) will transition from advanced development under PE 6.37.48.A, Mobility and Logistics Technology Demonstrations, to engineering development. STE-X is a follow-on development of the Simplified Test Equipment-Internal Combustion Engines and XM-1 (STE-ICE and STE-XM1). STE-ICE has been fielded and has proven its cost effectiveness over the past two years. STE-X will expand this concept to include combat vehicle electrical systems and organizational-level weapons systems tests. This program will provide the Army with a standard piece of organizational automatic test equipment to be used on all combat vehicles.

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Program Element: #6.47.46.A

Title: Automatic Test Support Systems (ATSS)

DOD Mission Area: #216-Land Combat Service Support

Budget Activity: #4-Tactical Programs

D. (U) COMPARISON WITH FY 1981 ROTE REQUEST: (\$ in thousands) Not applicable - Initial CDS.

E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands) None.

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Program Element: #6.47.46.A
DOD Mission Area: #216-Land Combat Service Support

Title: Automatic Test Support System (ATSS)
Budget Activity: #4-Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Simplified Test Equipment-Internal Combustion Engine (STE-ICE) program demonstrated the advantages of organizational-level automatic test equipment (ATE) for combat vehicles. STE-ICE allowed expanded maintenance testing in shorter time periods by personnel with limited training. The Simplified Test Equipment Expandable (STE-X) will expand STE-ICE to include vehicle electrical and fire control systems and will support all combat vehicles. STE-X will provide the Army with a standard piece of a ATE at the organizational level. The Army is fielding the AN/USM-410 (Equite) System as the standard general support ATE for electronic systems. This leaves only the direct support level needing standardized ATE. Program Element 6.37.48.A provides for the advanced development of the Direct Support Automatic Test Support System (DS-ATSS) to satisfy this requirement. DS-ATSS will include the capability for maintenance on both electrical and electro-optical systems. This program element includes the funding for the engineering development of DS-ATSS. Included under the DS-ATSS development will be an effort to standardize computer software and produce an ATLAS language compiler for use at all levels of maintenance.

G. (U) RELATED ACTIVITIES: Advanced development of ATE systems is performed under PE 6.37.48.A, Mobility and Logistics Technology Demonstrations. The ATE systems developed under this program will be used by all program managers and thereby eliminate the duplication inherent in the present practice of each program manager developing system-specific ATE.

H. (U) WORK PERFORMED BY: In-house work is performed by the US Army Communications Research and Development Command, Ft. Monmouth, NJ. STE-X contractor is RCA Corporation, Burlington, MA. Contractors for ATSS-DS will be determined via competitive bid.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Not Applicable.
2. (U) FY 1981 Program: Not Applicable.
3. (U) FY 1982 Planned Program: Begin engineering development of Simplified Test Equipment - Expandable (STE-X). Prepare implementation plan for integration of STE-X into the Army maintenance system.
4. (U) FY 1983 Planned Program: Continue development of STE-X. Begin engineering development of Direct Support Automatic Test Support System (ATSS-DS). Expand ATSS-DS to cover electro-optical systems. Begin fielding plan for ATSS-DS.
5. (U) Program to Completion: This is a continuing program.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 16.47.48.A

Title: Standoff Target Acquisition System (SOTAS)

DDO 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	66585	55575	71735	79390	48077	399784
0171	Standoff Target System	66585	55575	71735	79390	48077	399784

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The US Army lacks the capability to locate moving targets beyond ground line of sight. The speed of modern combat makes it critically important that the Division Commander have a responsive, near-realtime capability to detect, locate, and monitor moving formations out to the enemy's second echelon units beyond the Forward Line of Troops (FLOT)--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 1985-and-beyond 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 required to meet the operational requirement can be built.

Program Element: #6.47.48.A

Title: Standoff Target Acquisition System (SOTAS)

DOD Mission Area: #255 - Tactical Surveillance,

Budget Activity: #4 - Tactical Programs

Reconnaissance and Target Acquisition

C. BASIS FOR FY 1982 RDTE REQUEST: In FY 1982 significant emphasis will be placed on the integration of subsystems (radar, data link, YEH-60B helicopters and ground station modules) leading to delivery of SOTAS Engineering Development (ED) systems. One of the significant objectives of SOTAS Engineering Development (ED) program is to eliminate 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 1981 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	1QFY84	4QFY81
Operational Test (OT) II	2QFY84	4QFY81
ASARC III/DSARC III	4QFY84	2QFY82
Basic Production	1QFY85	2QFY82
Initial Operational Capability (IOC)		

The major differences between this submission and the FY 1981 submission result from difficulties encountered in meeting prior schedules under previous funding limits as reported in the 30 September 1980 Selected Acquisition Report. During the past year, the program has progressed through the Critical Design Review (CDR) milestone. The CDR confirmed that the technical approach is feasible with moderate development risk, but revealed that earlier funding and schedule projections were too optimistic. The funding profile and schedule have been revised accordingly.

Program Element: #6.47.48.A Title: Standoff Target Acquisition System (SOTAS)
 DOD Mission Area: #255 - Tactical Surveillance, Budget Activity: #4 - Tactical Programs
 Reconnaissance and Target Acquisition

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>FY 1983</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	66585	55575	71735	79390	48077	399784
Funds (as shown in FY 1981 submission)	66430	55050	21289	0	0	218816

The additional funding specified in the current submission results from: (1) \$2.584 million added by reprogramming FY 1979 and FY 1980 funds to cover increased costs in prime and data link contractors, (2) increased inflation in FY 1981 and FY 1982 (\$1.255 million), and (3) \$177.159 million added in FY 1982-1985 to accommodate the restructured development program. The funding profile and schedule are scheduled for review by the Army and Defense Acquisition Review Councils in March 1982. Funding for the Modular Integrated Communications Navigation System (MICNS), which was previously partially funded by SOTAS, is now shown under another Program Element, as described in paragraph G.

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
Aircraft Procurement, Army:						
Funds (current requirements)	0	0	0	0	1868400	1868400
Funds (as shown in FY 1981 submission)	0	0	7600	Not Shown	671000	678600

Program Element: #6.47.48.A

Title: Standoff Target Acquisition System (SOTAS)

DOD Mission Area: #255 - Tactical Surveillance,
Reconnaissance and Target Acquisition

Budget Activity: #4 - Tactical Programs

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Quantities (current requirements)	0	0	0	0		
Quantities (as shown in FY 1981 submission)	0	0	0	4		

The FY 1982 submission reflects current cost of hardware and the deferral of procurement due to the restructuring of the Engineering Development program. The procurement funds shown do not include initial spares, which will cost an additional \$178.7 million.

Program Element: #6.47.48.A

Title: Standoff Target Acquisition System (SOTAS)

DOD Mission Area: #255 - Tactical Surveillance,

Budget Activity: #4 - Tactical Programs

Reconnaissance and Target Acquisition

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 locate moving targets accurately 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 near-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 DI71, 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 Program Element (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 within 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 in PE 6.47.05.A. The MICNS program, which was under the SOTAS and RPV lines prior to FY 1982, is developing common data link components for SOTAS, 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-14 computer, developed by the US Navy, for both the airborne and ground elements of the system.

H. (U) WORK PERFORMED BY: Project Manager SOTAS has been chartered by the Department of the Army, under the US Army Electronics Research and Development Command. His headquarters is at Ft Monmouth, NJ. Additional supporting organizations

Program Element: #6.47.48.A

Title: Standoff Target Acquisition System (SOTAS)

DOD Mission Area: #255 - Tactical Surveillance,
Reconnaissance and Target Acquisition

Budget Activity: 4 - Tactical Programs

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 Avionics Flight Test Activity, Lakehurst, NJ; and the Army Engineering 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, CT; Honeywell, Inc, Minneapolis, MN; and Technology Services Corporation, Santa Monica, CA. There are seven other contractors with a total dollar value of \$2238K.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 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 Line of Troops (FLOT). 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 1977, 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 1977.

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 would

The SOTAS ED program was approved at an Army Systems

Program Element: #6.47.48.A

Title: Standoff Target Acquisition System (SOTAS)

DOD Mission Area: #255 - Tactical Surveillance,

Budget Activity: #4 - Tactical Programs

Reconnaissance and Target Acquisition

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 (I²) SOTAS, were deployed to Europe for service there until prototypes of the full-scale ED system become available. The first I² SOTAS system was delivered to the Third Armored Division in Europe in August 1978, and participated successfully in REFORGER 78. The second Interim-Interim (I²) SOTAS arrived in the First Armored Division in December 1978, permitting both I² SOTAS 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. Significant was obtained in a classified foreign test program. During FY 1980, the SOTAS RSI Plan was approved by the Office, Secretary of Defense. I² SOTAS participated successfully in Operation Anarak Express, a multinational exercise held on Norway. A 1/6-scale advanced design radar antenna and its supporting software were built and successfully tested in the demonstration. Successful Preliminary and Critical Design Reviews were conducted for Motorola, Sikorsky, and Harris. Full-scale mockups of the airborne electronic systems and the ground stations were completed, and one UH-60 airframe was modified with a mockup antenna and flown in a risk-reduction test program.

2. (U) FY 1981 Program: In FY81 efforts will continue on the design and fabrication of the airborne and ground station subsystems. Radar antenna test models will undergo near- and far-field range performance evaluations. First flight and airworthiness tests will begin on the first YEH-60B helicopter. Modification of the second YEH-60B will be completed. Alternate data link systems will be completed and delivered for integration and testing. Ground station functions will be demonstrated, and the ground station simulator completed.

3. (U) FY 1982 Planned Program: The scope of development activity will expand significantly, with increased testing of subsystems and the commencement of systems integration. Contractor airworthiness tests and preliminary government flight tests will be completed. Avionics electrical tests will begin. Software for both the airborne and the ground station subsystems will be completed. The radar will complete tower trials, which will lead to a systems test involving the radar, the data link, and the ground station. Modification of the remaining helicopters will begin. Training of the Army pilots and ground station operators will be initiated.

4. (U) FY 1983 Planned Program: Modified airframes will be delivered to the electronics prime contractor for the

Program Element: #6.47.48.A Title: Standoff Target Acquisition System (SOTAS)
DOD Mission Area: #255 - Tactical Surveillance, Budget Activity: #4 - Tactical Programs
Reconnaissance and Target Acquisition

Installation of complete airborne electronic subsystems. Integration and testing of complete ground and airborne systems will be initiated in preparation for Development and Operational Test (DT/OT) II, which will be conducted during FY 1984.

5. Program to Completion: In FY 1984, Development and Operational Tests (DT/OT) II will be conducted. Successful completion of these tests will provide the basis for a production decision by the Army and Defense Systems Acquisition Review Councils (ASARC/DSARC) III. A favorable decision at DSARC III would lead to award of a production contract in FY 1985 and an Initial Operational Capability (IOC) in _

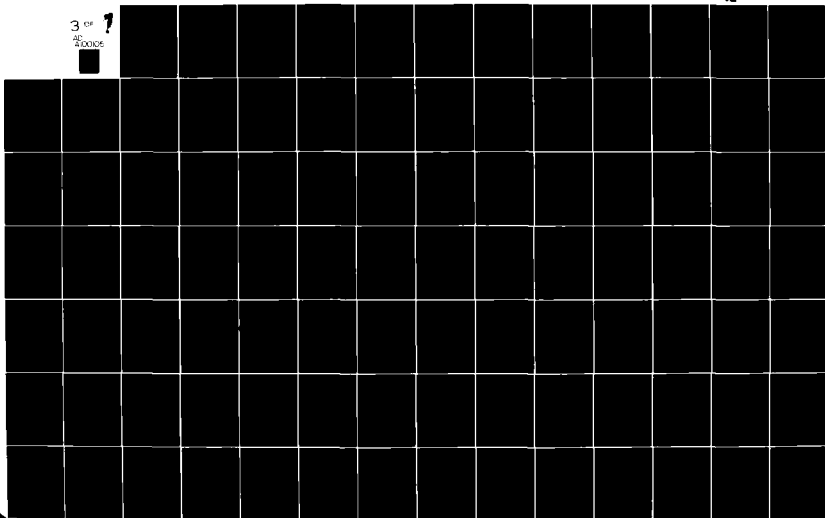
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Program Element: # 6.47.48.A
DOD Mission Area: # 255 - Tactical Surveillance,
Reconnaissance & Target Acquisition

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

J. 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 near 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

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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

Indicator (MTI) radar, the YEH-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 is developing the 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. Primary participants in the development test include the Army Systems Analysis Agency (ANSAA) and the Test and Evaluation Command (TECOM).

e. (U) Development Test (DT) II is scheduled to be conducted at Fort Hood, TX. Testing at Fort Hood will use personnel from a unit yet to be designated. Testing and evaluation will be completed in time for the Army and Defense Review Councils III (ASARC/USARC III).

f. (U) Assets available for testing will include YEH-60B BLACKHAWK helicopters, each equipped with an advance design coherent X-band radar, five ground stations five secure data links, and five 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 Hood, TX. 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.

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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

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.

d. (U) A Reliability, Availability, and Maintainability (RAM) subcommittee, under the Test Integration Working Group (TIWG) has been formed to establish appropriate RAM scoring criteria 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 (I²) 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.

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 probability
 of detecting moving tank-
 sized target)

Accuracy

Endurance
 Target Types
 Target Velocity
 Type of Scan

2-4 hours, IFR
 Tanks, Trucks, Helicopter
 X-band coherent mechanical and/or
 electronic scan

1 hour, VFR only
 Tanks, Trucks, Helicopter
 Mechanical Scan

Rain Performance

Essentially rain independent

Quantified field test not conducted

Electronic Counter-
 Countermeasure (ECM)
 Capability

Defense Intelligence Agency
 threat responsive

Tests conducted on the emulation
 test-bed radar show that
 proposed ECM 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 OF I/OT I)

Reliability, Availability,
Maintainability (RAM) goals:

Probability of system completing
2-hr mission 0.8

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 0.8

See note above

Mean Time Between Maintenance
Failures (Airborne Equipment) 27.0 hrs

See note above.

FY 1992 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARYI

Program Element: #6.47.50.A

DOD Mission Area: #257 - Electronic Warfare & Counter-Int

Title: Tactical Electronic Countermeasures Systems

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1991 Estimate	FY 1982 Estimate	FY 1993 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable Not Applicable
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	21946	3277				
DL12	Communications Electronic Countermeasures Systems	22851	2524			Continuing	Not Applicable
DL13	Noncommunications Electronic Countermeasures Systems	1095	753			Continuing	Not Applicable
DL14	Expendable Jammers	0	0			Continuing	Not Applicable
D540	Protective Electronic Warfare Systems	0	0			Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program encompasses the development of tactical electronic countermeasures equipment and systems mounted in both ground vehicles and aircraft. These electronic countermeasures (ECM) systems and equipment are for use by brigade, 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

C. BASIS FOR FY 1992 RDTE REQUEST: Continue development of the AN/MLQ-33, communications jammer (CAS ECM), and expendable communications jammers. Begin engineering development of product improvements to TACJAM and QUICK FIX

Program Element: #6.47.50.A

DOD Mission Area: #257 - Electronic Warfare & Counter-C3I

Title: Tactical Electronic Countermeasures Systems

Budget Activity: #4 - Tactical Programs

to increase their frequency capability. Reconfigure the AN/TLQ-17A division-level high and very high frequency communications jammer from one-quarter-ton wheeled vehicle to an armored shelter mounted on tracks. Begin adding jamming capability to TACJAM.

D. COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	23946	3277		Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	25351	11200		Continuing	Not Applicable

The decrease of \$1495 thousand in FY80 is due to a reduction of \$700 thousand in DL12 because of failure of the helicopter jamming system, AN/ALQ-143 MULTEWS, to meet operational requirements and to a decision to delay a planned follow-on program. Also a reduction of \$795 thousand in DL13 occurred because development of AN/ALQ-150 CEPFIRE TIGER jammer was terminated.

The decrease of \$7923 thousand in FY81 is due to a reduction in DL12 for MULTEWS termination and a reallocation to higher priority requirements.

The decrease of \$12296 thousand in FY82 is due to a reduction of \$8977 thousand in DL12, \$653 thousand in DL13, and thousand in D540 for higher priority requirements.

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Other Procurement, Army ^{1/}						
Funds (current requirements)	0	0	0	0		
Funds (as shown in FY 1981 submission)	0	0	0	Not Shown		
Quantities (current requirements)	0	0	0	0		
Quantities (as shown in FY 1981 submission)	0	0	0	Not Shown		

^{1/} Funds/Quantities shown are for AN/MLQ-33 (CAS ECM).

NOTE: See PE 6.37.55-A, Tactical Electronic Countermeasures Systems, for details of QUICK FIX associated procurement.

Program Element: #6.47.50.A

DOD Mission Area: #257 - Electronic Warfare & Counter-CM

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 airborne ECM systems. Developments include: close air support communications jammer (CAS ECM); helicopter communications jamming system (QUICK FIX); Tactical Army Communications Jammer (TACJAM), quick-erectable antenna masts and assemblies; automated test equipment software development for all systems; expendable jammers-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 Improvement. Air Force developments are conducted in Program Element 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 are conducted by the Army's Electronic Warfare Laboratory, Fort Monmouth, NJ; 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. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: AN/GI-Q-3 and AN/TI-Q-15 (jammers) were developed and fielded. The AN/TI-Q-17 (transportable communications jammer) completed development and was fielded. A contract for Full-Scale Development of the AN/MLQ-33 (CAS ECM) system was awarded in September 1979. The conversion of the Army's standard division-level helicopter communications intercept, jamming, and direction-finding system QUICK FIX from the EH-1 to the UH-60A BLACKHAWK was started. Engineering development of a joint Army/Marine Corps expendable jammer was started.

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 1981 Program: The program to convert QUICK FIX from its current EH-1 platform to the UH-60A BLACKHAWK will continue. Engineering development of the AN/MLQ-33 countermeasures system will continue. Engineering development of expendable jammers will continue.
3. FY 1982 Planned Program: The program to convert QUICK FIX will continue. Engineering development of the AN/MLQ-33 and expendable jammers will continue. A program to reconfigure the AN/TLQ-17A division-level high frequency and very high frequency communications jammer from one-quarter-ton wheeled vehicle to an armored shelter which will be track mounted will begin. TACJAM will be improved by adding jamming capability.
4. FY 1983 Planned Program: Conversion of QUICK FIX to the UH-60A helicopter will be completed. Engineering Development of the AN/MLQ-33 will be completed. Reconfiguration of AN/TLQ-17A will continue. A developmental product improvement program of currently deployed Communications Jammers will be continued.
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 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # DL12

Title: Communications Electronic Countermeasures Systems

Program Element: # 6.47.50.4

Title: Tactical Electronic Countermeasures Systems

DOD Mission Area: # 257 Electronic Warfare & Counter-C³I

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 communications electronic countermeasures (ECM) equipment and systems to assist the tactical Army (Brigade, Division, and Corps) 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. Noncommunications and expendable jammer development have been moved to Project DL13, Non-Comm ECM, and DL14, Expendable Jammers, respectively for this program element for FY82 and outyears.

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 exchange of RDTE resume cards and technical reports, attendance at scientific meetings and conferences, 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 are accomplished by the US Army Signals Warfare Laboratory, Warrenton, VA; and the Product Manager for Special Electronic Mission Aircraft, St. Louis, MO.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: AN/GLQ-3 (jammer) was developed, tested,

Project: # DL12

Program Element: # 6.47.50.A

DOD Mission Area: # 257 Electronic Warfare & Counter-C

Title: Communications Electronic Countermeasures Systems

Title: Tactical Electronic Countermeasures Systems

Budget Activity: #4 - Tactical Programs

procured and fielded. Engineering development of the AN/MLQ-33, a communications jammer, was initiated in September 1979. The conversion of the Army's standard division-level airborne communications intercept, jamming, and direction-finding system QUICK FIX from the EH-1 to UH-60A BLACKHAWK was started. This system will be the Army's division level standard airborne communications intelligence and electronic warfare system. Engineering development of a joint Army/Marine Corps expendable jammer was started.

2. FY 1981 Program: Conversion of the QUICK FIX II Heliborne Jamming System from the EH-1 to the UH 60A BLACKHAWK will continue. Engineering development of the Army/Marine Corps expendable jammer will continue. Engineering development of the AN/MLQ-33 countermeasures system will continue.

3. FY 1982 Planned Program: Conversion of the QUICK FIX II Heliborne Jamming System from the EH-1 to the UH-60A BLACKHAWK will continue. Engineering development of the AN/MLQ-33 will continue. A program to reconfigure the AN/TLQ-17A Division level high frequency and very high frequency communications jammer from one-quarter-ton wheeled vehicle to an armored shelter which will be mounted on a tracked vehicle will be started to improve mobility. The AN/TLQ-17A will continue to be used with heliborne QUICK FIX as the jamming portion of that system and in its wheeled version for the Army Rapid Deployment Forces and the Marine Corps Units. A program to improve TACJAM, a jammer mounted in an armored shelter one-tracked vehicle, by adding jamming capability. Improvement will be a computer-aided subsystem.

4. FY 1983 Planned Program: Conversion of the QUICK FIX II System from the EH-1 to the UH-60A BLACKHAWK will be completed. The AN/MLQ-33 fabrication will be completed and Developmental and Operational Testing - Type III (DT/OT III) will begin. The AN/TLQ-17A reconfiguration into an armored shelter mounted on a tracked vehicle will continue. The improvement to add jamming capability to TACJAM will continue, and a developmental product improvement to analyze communications from enemy emitters will be started.

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 DL12, Communications Electronic Countermeasures Systems.

Project: # DL12 Title: Communications Electronic Countermeasures Systems
 Program Element: # 6.47.50.A Title: Tactical Electronic Countermeasures Systems
 DOD Mission Area: # 257 Electronic Warfare & Counter-C-1 Budget Activity: #4 - Tactical Programs

6. (U) Major Milestones:

Task Name	Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
QUICK FIX/BLACKHAWK	ED Contract Award	4 Qtr FY 1980	Not Shown

7. Resources (\$ in thousands):

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE, A						
Funds (current requirements)	22851*	2524*			Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	23551	10391		Not Shown	Continuing	Not Applicable

Quantities: Not Applicable

*Decrease in FY 1980, 1981, and 1982 is due to termination of the AN/ALQ-143 MULTEWS program for failure to meet operational requirements and applications of Congressional general reductions. Decrease in FY 1982 also is attributed to restructuring of the overall program element by moving expendable jammers and noncommunications jammers to Projects DL14, Expendable Jammers, and DL13, Non-Comm ECM, respectively.

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Other Appropriations***						
Other Procurement, Army						
Funds (current requirement)	0	0	0	0		

Project: # DL12 Title: Communications Electronic Countermeasures Systems
 Program Element: # 6.47.50.A Title: Tactical Electronic Countermeasures Systems
 DOD Mission Area: # 257 Electronic Warfare & Counter-C-1 Budget Activity: #4 - Tactical Programs

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Funds (as shown in FY 1981 submission)	0	0	0	Not Shown		
Quantities (current requirement)	0	0	0	0		
Quantities (as shown in FY 1981 submission)	0	0	0	Not Shown		

***Funds/Quantities shown are for AN/MLQ-33.

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

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FY 1982 RDTF CONGRESSIONAL DESCRIPTIVE SUMMARY

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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	24963	21522	31334	36563	Continuing	Not Applicable
	QUANTITIES						
D298	JINTACCS (NATO)	1288	2152	3623	6090	Continuing	Not Applicable
D309	JINTACCS (ARMY)	10786	8946	13270	19445	Continuing	Not Applicable
D310	JINTACCS (Executive Agent)	12889	10424	14441	12028	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for accomplishment of the unique tasks required of the Chief of Staff, US Army, to perform the mission of Executive Agent for the JINTACCS program. The JINTACCS program was established for the purpose of insuring compatibility and interoperability of tactical command and control systems to improve the overall tactical effectiveness of the US Armed Forces in joint service/agency battlefield operations. 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. As a participant, the Army will provide operational facilities and supporting automated systems to be configured 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. In addition, the Tactical Air Control System/Tactical Air Defense System (TACS/TADS) interface program is currently being transitioned into the JINTACCS program as directed by the JCS. Each JINTACCS participating Army facility and system must be designed or modified to utilize JINTACCS 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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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

C. (U) BASIS FOR FY 1982 RDTE REQUEST: During FY82 the Executive Agent will conduct compatibility and interoperability (C&I) testing of the Air Operations functional segment and will assume the responsibility for testing in support of TACS/TADS configuration management. Planning for the C&I testing of the Operations Control functional segment will be undertaken. Efforts to maintain and refine the technical interface design plan will continue, utilizing the configuration management process, and work will continue in the development of the JTIDS message standards. JINTACCS NATO objectives center on implementation of the US master plan to interface with NATO tactical command and control system interoperability efforts, studying NATO tactical command and control system architecture, and providing support to US delegates to NATO.

(U) JINTACCS Army objectives: 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. 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. 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. Participate in Operations Control C&I testing; 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.

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
Begin compatibility and interoperability testing of intelligence segment	July 1979	July 1979
Begin compatibility and interoperability testing of air operations segment	November 1981	January 1981
Begin compatibility and interoperability testing of operations control segment	November 1982	January 1981

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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

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Begin compatibility and interoperability testing of amphibious/fire support segment	October 1983	July 1983

Differences between the current milestones and those reported in the FY 1981 submission have resulted from knowledge gained during the past year with testing of the Intelligence functional segment. Also, the dates for the tests have been adjusted to match the delivery schedule of the Joint Interface test system and to shorten the test period of each segment. The overall test completion date has not been changed.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	24963	21522	31334	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	29129	23200	42072	Continuing	Not Applicable

Decreases in FY80 and FY81 are attributable to the application of general Congressional reductions. Decrease in FY82 results from redistribution of funds during the Army prioritization process.

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

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Program Element: 96.47.79.A

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

DOD Mission Area: 8254 - Tactical Command and Control

Budget Activity: 84 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: 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, and work 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 GANO to JINTACCS. In FY 1978 work continued on the engineering design plans for all five functional segments and the plan for the Intelligence segment was completed and approved for testing. 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 was initiated. The JITF organizational plan was completed and approved. PM 99 revision was completed and submitted to JCS/OSD for approval. In FY 1980 the design plans for the remaining functional segments were completed and approved. Testing of the Intelligence segment was conducted and plans were begun for testing of the Air Operations segment. Work was undertaken on the preparation of a Memorandum of Agreement between the JINTACCS Executive Agent for the transition, from TACS/TADS to JINTACCS, of the responsibility for testing in support of TACS/TADS configuration management. Adjustments were made to the schedule for C&I testing in order to reduce the length of separate tests and match the test dates to the delivery dates of the Joint Interface Test System. These adjustments did not affect the completion date of the test period.

G. (U) RELATED ACTIVITIES: This program is related to the USA Tactical C³ Systems Engineering program which is funded under Program Element 6.47.12.A, whose goals complement the JINTACCS program (Interoperability across Service lines) by striving for intraoperability (interoperability within the Army). Close liaison precludes duplication of effort.

H. (U) WORK PERFORMED BY: Overall coordination and management of the NATO and 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, the National Security Agency (NSA), and the Defense Intelligence Agency (DIA). Joint coordination is accomplished by the JINTACCS Service/Agency Support Office. A Joint Interface Test Force (JITF) has been formed and is located at Fort Monmouth, NJ. Management of the JINTACCS (Army) program is provided by the Communications Research and Development Command (CORADCOM), Fort Monmouth, NJ.

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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

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: In 1977, Congress deleted all but \$1.0 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 and the following work was accomplished:

a. (U) Development and maintenance of the JINTACCS Army Management Plan (JAMP), established and activated the Army Test Unit, planned and established Army Interoperability Test Integration Working Group (TIWG), continued work on the engineer design plans for all five functional segments and the plan for the Intelligence segment was completed and approved for testing.

b. (U) Development of message standards for JTIDS was continued. JINTACCS involvement in NATO standardization activities was expanded. In FY 1979 the JTIC 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 Data Element Dictionary was initiated. PM 99 revision was completed and submitted to Joint Chiefs of Staff/Office of the Secretary of Defense for approval. In FY 1980 the design plans for the remaining functional segments were completed and approved. Testing of the Intelligence segment was conducted, and plans were begun for testing of the Air Operations segment.

2. (U) FY 1981 Program: This year will see the completion of the Intelligence compatibility and interoperability tests and the collection of Army-oriented test data using ATU resources, forwarding of material to CINCLANT for the Intelligence Operational Effectiveness Demonstration (OED), and participation in the OED. The program will continue refinement, through configuration management procedures, of the engineering design plans, continue development of the JTIDS message standards and continue preparation for the assumption of TACS/TADS configuration management testing. Modifications will begin on the TACFIRE system to interface with the Marine Corps MIFASS system. NATO goals are to propose and develop a US master plan to interface with the developing NATO interoperability plan, assume responsibility for NATO-related TACS/TADS activities, and continue to study, analyze, and plan US NATO tactical command and control system interoperability.

3. (U) FY 1982 Planned Program: Plans include implementation of the US master plan to interface with NATO tactical command and control system interoperability efforts; studying NATO tactical command and control system architecture, and providing support to US delegates to NATO. Air Operations C&I testing will be conducted Nov 81 thru May 82. Configuration

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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

management testing for TACS/TADS will commence in October 1981. The program will also continue maintenance and refinement of the engineering design plans through the configuration management process and initiate training for ATU support personnel and Operational Facility/system team personnel for participation in Amphibious and Fire Support C&I testing.

4. (U) FY 1983 Planned Program: The program will conduct Operations Control C&I testing November 1982 thru February 1983, continue to maintain and refine the engineering design plans, continue testing in support of TACS/TADS configuration management, participate in the OED of the Air Operations functional segment, and develop plans for C&I testing of the JTIDS message standards. Also will complete final test report detailing C&I test results for Air Operations; complete all preparations for beginning Amphibious and Fire Support C&I Functional Segment testing. NATO efforts call for continuation of implementation of the US master plan in interfacing with NATO tactical command and control systems interoperability efforts, and the continuation of technical support to US delegates to NATO.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D309

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

Program Element: #p.47.19.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) 6.47.19/0310 (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 SIGMA), all to be configured 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. In addition, the Tactical Air Control System/Tactical Air Defense System (TACS/TADS) interface program is currently being transitioned into the JINTACCS program as directed by the JCS. Each JINTACCS participating Army facility and system must be designed or modified to utilize JINTACCS 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.

B. (U) RELATED ACTIVITIES:

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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

1. (U) 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 the same program element as the Joint Advanced Tactical Command, Control, and Communications Program, Tactical Air Control System/Tactical Air Defense System (TACS/TADS), Program Element 6.47.12.A (USA Tactical C3 Systems Engineering)/D321.

2. (U) Program Element 6.47.12.A (USA Tactical C3 Systems Engineering)/D321, Joint Advanced Tactical Command, Control, and Communications Program (TACS/TADS). The TACS/TADS interface program has designed, implemented, and tested procedures that permit interoperability among specific air defense and air control systems of the Army, Navy, Air Force, and Marine Corps. In accordance with JCS Memorandum JCSM-226-79 of 5 July, Subject: Revision of DoD Program Memorandum 99, responsibility for testing to support the TACS/TADS interface design standards was to be assumed by the JINTACCS executive agent in October 1980.

3. (U) Program Element 6.47.12.A (USA Tactical C3 Systems Engineering)/D324, USA/NATO Tactical C3 Systems Interoperability. The objective of this program is to define Army-NATO tactical 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 Program.

4. (U) Program Element 6.47.12.A (USA Tactical C3 Systems Engineering)/D323, System Engineering For Tactical C3 Systems. 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.

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

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: CORADCOM Interoperability Standards Division of the Center for Systems

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Project: #0309

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: #6 - Tactical Programs

Engineering and Integration (CENSEI) managed the Army's participation in JINTACCS and was responsible for funding support to Army project managers, laboratories, test activities, and contractors as related to the following:

<u>Accomplishments</u>	<u>Completion Date</u>
(a) (U) Development of the JINTACCS Army Management Plan (JAMP)	DA Approved 2/79
(b) (U) For each JINTACCS functional segment listed, Army positions were developed, coordinated and defended at Joint Technical Coordinating Committees (TCC), Developmental Interface Analysis Groups (DIAG), Operational Interface Analysis Groups (OIAG), and Joint Interface Configuration Management Boards (JICMB).	
(1) (U) <u>Intelligence and Intelligence Supplement Functional Segment</u>	10/80
(2) (U) <u>Air Operations Functional Segment</u>	9/80
(3) (U) <u>Fire Support Functional Segment</u>	10/80
(4) (U) <u>Amphibious Functional Segment</u>	10/79
(5) (U) <u>Operations Control Functional Segment</u>	10/80
(c) (U) Developed, coordinated, and defended Army positions for the JINTACCS Message Element Dictionary and Keyword Catalog (MED/CAT) at TCCS, DIA/CS, OIAGS, to insure adequacy of C&I testing, preparation of OEO and CMT, and the development of TIDP-related training material.	3/80

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Project: #D309

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

Program Element: 36.47.79.A

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

DOD Mission Area: #254 - Tactical Command and Control Budget Activity: 34 - Tactical Programs

- (d) (U) Developed and coordinated Army technical positions for the selection of Data Communications (Data Comm) interface standards for joint operations and the establishment of joint interface communications architectures for operational facilities. 7/80
- (e) (U) Initiated C&I testing for JINTACCS Program 7/79
- (f) (U) Army OPFAC established and equipment installed (ATU portion). 6/79
- (g) (U) Planned and established Army Interoperability Test Integration Working Group (TIWG) 3/78-6/79
- (h) (U) Assisted in preparation of JINTACCS Technical Interface Concept (TIC) JCS Approved 3/77
5/79 (Rev 1)
- (i) (U) Provided Army inputs to Program Memorandum 99 for System Costs and Schedules 4/79
- (j) (U) Prepared and implemented Army operational facility/system training program 4/79-6/85
- (k) (U) Initiated Army Test Unit personnel training program 4/79
- (l) (U) Established and activated the Army Test Unit 4/79
- (m) (U) Assisted in preparation and implementation of JINTACCS Configuration Management Plan 4/79 (Change 1)
Approved 3/78

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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

Accomplishments	Completion Date
(n) (U) Started contractual support to Army-JINTACCS Programs	10/78
o (U) Army Test Unit Training--System Development Corporation	4/79
o (U) Army Test Unit Support--HITRE Corporation	4/79
o (U) Teleprocessing Design Center--Control Data Corporation	9/78
o (U) System Engineering--System Development Corporation	8/78
o (U) Emulation System Engineering--Control Data Corporation	2/78
(o) (U) Contributed to development of JINTACCS-NATO Ad Hoc Group (JINAG) Management Plan	3/79
(p) (U) Provided JINTACCS inputs to Army Battlefield Automated Interoperability System Engineering (DA Approved) Management Plan (BATSEMP)	2/79
(q) (U) Supported Battlefield Exploitation and Target Acquisition (BETA) Implementation of JINTACCS Messages	12/78
(r) (U) Participated in establishing Joint Interface Configuration Management Board	10/78
(s) (U) Developed Army Test Unit Plans	1/78-10/78
(t) (U) Activated DARCOM Representation to JINTACCS Service/Agency Support Office (ISASO)	10/77

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Project: #D109

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

Accomplishments

Completion Date

(u) (U) Supported development of JINTACCS modifications to NATO ADATP-3 Message Format Rules for Joint Reporting Structure

9/76-1/78

2. (U) FY 1981 Program: CORADCOM Interoperability Standards Division of the Center for Systems Engineering and Integration (CENSEI) is managing and assisting 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 C&I testing and the collection of Army-oriented test data using ATU resources; conduct OED testing for Intelligence functions; continuation of 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 FY82 --Finalize Army plans for Operations Control C&I testing. Tasks Continuing Through FY82 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 JINTACCS MED/CAT; assist in preparation of JINTACCS Interface Design Handbook; contribute to development of JINTACCS-NATO Management Plan; support BETA implementation of JINTACCS messages; provide Army input to Program Memorandum 99 for Service costs and schedules; provide full-time DARCOM representatives to JINTACCS Service/Agency Support Office (ISASO); provide full-time Army representatives to JINTACCS JTF; assist in preparation of JINTACCS OED plans; provide for contractual support for: (1) JINTACCS System 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 TRADOC System Managers to provide for timely integration of JINTACCS standards into participating Army systems; begin modifications to the TACFIRE system to interface with the Marine Corps MIPASS system; assist in the configuration control over the JINTACCS TIDP-TE, the MED/CAT, and Interface Design Handbook; coordinate with Army PM's and TSM's in the integration of JINTACCS standards into participating Army OPFACs/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 TACS/TADS into the JINTACCS

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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

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 TACFIRE, AN/TSQ-73/PATRIOT, and ASAS; develop preliminary plans for C&I testing of JTIDS Message Standards; development of system-level parameters and standards for implementation of command and control subordinate systems (CDS2).

3. (U) FY 1982 Planned Program: CORADCOM Interoperability Standards 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.

4. (U) FY 1983 Planned Program: CORADCOM Interoperability Standards 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 FY83--Complete final test report detailing C&I test results for Air Operations; complete all preparations for Air Operations (S Intelligence) OED; complete all preparations for beginning Fire Support and Amphibious C&I Functional Segment 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.

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Project: #D399

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)

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

5. (U) Program to Completion: This is a continuing program. The period after FY 1983 will include continued modification of Army systems based on the JINTACCS standards and modifications thereof 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 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 systems.

6. (U) Major Milestones:

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
Initiate Compatibility and Interoperability Testing	4Q FY79	3Q FY79 thru 1Q FY85
Complete Intel (CENSEI) C&I Tests	2Q FY80	2Q FY80
Complete Intel (SCI) C&I Tests	1Q FY81	-
Complete Air Ops C&I Tests	3Q FY82	-
Complete Ops Control C&I Tests	2Q FY83	-
Complete Fire Support/Amphib C&I Tests	2Q FY84	-
Data Communication Standards Validation (tentative)	1Q FY83	2Q FY80
Joint Tactical Information Distribution System (JTIDS)-Message Standards	1Q FY82	3Q FY80
Complete JTIDS C&I Tests	3Q FY85	-
TACS/PADS Transition to JINTACCS Progr	1Q FY82	-
Operational Effectiveness Demonstrations	3Q FY81 thru 3Q FY85	3Q FY81 thru 3Q FY85
Configuration Management Testing	2Q FY83	3Q FY81 thru 3Q FY85
Army Operational Facility/System Implementation	2Q FY79 thru 3Q FY85	4Q FY80 thru 2Q FY84
IGS Approval of Final Addition TIDP/JINTACCS Standards	1Q FY86	

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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

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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	10786	8946	13270	18445	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	15152	9566	19748		Continuing	Not Applicable

The differences 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.

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FY 1982 RDT&E 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

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Program

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Joint Interoperability of Tactical Command and Control Systems (JINTACCS) Program came into being in August 1977, upon the reorganization and redesignation of the Joint Ground and Amphibious Military Operations (GAMO) Program which was begun in April 1971. The purpose of JINTACCS is 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, has been assigned the responsibility to accomplish the joint aspects of the program as the JCS Executive Agent. Additionally, the JINTACCS Program Director has been given responsibility for development of the message standards to be used with the Joint Tactical Information Distribution System (JTIDS). This program will develop the technical standards necessary for compatibility and interoperability of tactical command and control systems and tactical facilities of the Services and Agencies, and will conduct joint testing of major interfaces between these systems and facilities.

B. (U) RELATED ACTIVITIES: This program is related to the USA Tactical C3 Systems Engineering 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 liaison 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 Architect/Engineer whose office is located within the Office of the 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 JSASO. Management of the JINTACCS (Army) program (D309) is provided by the Communications Research and Development Command, Fort Monmouth, NJ. The primary contractors performing work for this project are the System Development Corporation which supports the Architect/Engineer's Office from its office in McLean, VA, the Planning Research Corporation which supports the Joint Interface Test Force from its office at Fort Monmouth, NJ, and the Command, Control and Communications Corporation (of Torrance, CA) which is furnishing a joint interface test system for use at the Fort Monmouth test facility.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

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Project: #0310

Program Element: #6.47 79.A

DOD Mission Area: #254 - Tactical Command and Control

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

Title: Joint Interoperability of Tactical Command and Control Systems

Budget Activity: #4 - Tactical Programs

1. (U) FY 1980 and Prior Accomplishments: 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, and work 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 CAMO to JINTACCS. In FY 1978 work continued on the engineering design plans for all five functional segments, and the plan for the Intelligence segment was completed and approved for testing. Development of message standards for JTIDS was continued. In FY 1979 the JITC was activated and began C&I testing of Intelligence in July. 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 was initiated. The JITF organizational plan was completed and approved. PM 99 revision was completed and submitted to JCS/OSD for approval. In FY 1980 the design plans for the remaining functional segments were completed and approved. Testing of the Intelligence segment was conducted and plans were begun for testing of the Air Operations segment. Work was undertaken on the preparation of a Memorandum of Agreement between the JINTACCS Executive Agent for the transition, from TACS/TADS to JINTACCS, of the responsibility for testing in support of TACS/TADS configuration management. Adjustments were made to the schedule for C&I testing in order to reduce the length of separate tests and match the test dates to the delivery dates of the Joint Interface Test System. These adjustments did not affect the completion date of the test period.

2. (U) FY 1981 Program: This year will see the completion of the Intelligence compatibility and interoperability tests, forwarding of materiel to CINCLANT for the Intelligence Operational Effectiveness Demonstration (OED) and participation in the OED. The program will continue refinement, through configuration management procedures, of the engineering design plans, continue development of the JTIDS message standards, and continue preparation for the assumption of TACS/TADS configuration management testing.

3. (U) FY 1982 Planned Program: Air Operations C&I testing will be conducted Nov 81 thru May 82. Configuration management testing for TACS/TADS will commence in October 1981. The program will also continue maintenance and refinement of the engineering design plans through the configuration management process.

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Project: #0110

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

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

4. (U) FY 1981 Planned Program: The program will conduct Operations Control C&I testing Nov 82 thru Feb 83, continue to maintain and refine the engineering design plans, continue testing in support of TACS/TADS configuration management, participate in the OED of the Air Operations functional segment, and develop plans for C&I testing of the JTIDS message standards.

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

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Begin compatibility and inter-operability testing intelligence segment	July 1979	July 1979
Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Begin compatibility and inter-operability testing air operations segment	November 1981	January 1981
Begin compatibility and inter-operability testing operations control segment	November 1982	January 1982
Begin compatibility and inter-operability testing amphibious/ fire support segment	October 1983	July 1983

Changes to these milestones are the result of knowledge gained during the testing of the intelligence segment. They more closely match the projected delivery dates of the components of the Joint Interface Test System and allow for shorter periods of testing for each segment.

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Project: #0310

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

DDO Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

1. (U) Resources (\$ in thousands):

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	12889	10424	14441	12028	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	12177	11324	18405	-	Continuing	Not Applicable
Quantities (current requirements)						Not Applicable
Quantities (as shown in FY 1981 submission)						-

The increases in FY80 picks up a small portion of increased needs due to inflation. The decreases shown in FY81 and FY82 are due to reductions made when funding priorities were rearranged during the Army budget process.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.10.A

DOD Mission Area: #215 - Land Combat Support

Title: Joint Chemical/Biological Contact Point and Test

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	824	729	1428	1423	Continuing	Not Applicable
D049	Joint Chemical/Biological Contact Point and Test	824	729	1428	1423	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Potential adversaries (Russia and Warsaw Pact countries) 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 Commander's 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 long term research and development efforts. This data also supports development of user requirements documents and tactical doctrine. Dugway Proving Ground (DPG) is the only DOD facility possessing the specialized personnel, equipment, and facilities (including real estate) to provide the broad range of 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) equipment for the Services.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Three operational tests and one technical data source book will be in progress and/or completed. The tests will evaluate mission degradation associated with wearing of chemical protective clothing, air-

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Program Element: #6.57.10.A
DOD Mission Area: #215 - Land Combat Support

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

craft operations in a toxic environment, and problems of conducting an amphibious operation in a toxic environment. The technical data source book will review and access available technology and identify future requirements in chemical agent detection and advanced warning devices.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	824	729	1428	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	674	1081	1357	Continuing	Not Applicable

The \$150 thousand increase in FY 1980 was the result of Army reprogramming to permit the completion of an ongoing test for the US Marine Corps on logistical operations in a contaminated environment. The decrease of \$352 thousand in FY 1981 funding level is a result of a reduction by Congress for studies and analysis (\$ 258 thousand) and a general Congressional reduction of \$84 thousand. The \$71 thousand increase in FY 1982 is the result of higher fuel, inflation, and civilian pay pricing indices than were applied last year.

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

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Program Element: #6.57.10.A
DOD Mission Area: #215 - Land Combat Support

Title: Joint Chemical/Biological 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 Chemical-Biological (CB) defense test and CB technical data source books. The tests and studies provide essential operational data on nondevelopmental chemical weapon systems and chemical/biological defense materiel to determine whether tested items and/or systems meet the military technical characteristics required by the user. The 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). To support the entire Army field testing program, this project conducts a continuous test effort to review, evaluate, and select suitable chemical agent simulants.

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 for 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 1980 and Prior Accomplishments: From the program initiation in FY 1976 through FY 1979, a total of twelve tests, nine operation research studies, and eleven technical data source books have been completed and reports published. During FY 1980, three operational tests 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 operational 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 1981 Program: Three tests and one technical data source book will be initiated in FY 1981. All efforts are in response to validated requirements submitted by the Unified Commanders and Services. Priority for the sequence of con-

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Program Element: #6.5/.10.A
DOD Mission Area: #215 - Land Combat Support

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

ducting the planned effort was established at a joint services coordination meeting. The tests will evaluate simulants for field testing, a West German decontaminant, mission degradation associated with chemical protection, and aircraft operations in a toxic environment. Work will be initiated on a data source book on thickened nerve agents identified as a potential threat to US forces on the modern battlefield.

3. (U) FY 1982 Planned Program: Three operational tests and publication of one technical data source book are scheduled for FY 1982. The tests will evaluate mission degradation associated with wearing chemical protective clothing, and problems encountered when operating aircraft and conducting amphibious operations in a toxic environment. The technical data source book will assess the operational capability of currently available detection and warning devices and identify requirements for new developments.

4. (U) FY 1983 Planned Program: Five tests, one study, and one source book are planned for initiation, and/or completion in FY 1983. The tests will evaluate the effects of a toxic environment on various combat and combat support operations. The study will address the personnel problems associated with use of chemical protective clothing. Protective equipment will be the subject of the data source book.

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

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.13.A

DOD Mission Area: #254 - Tactical Command and Control

Title: Battlefield Systems Integration

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	0	0	0	0	11134
DF26	Battlefield Systems	0	0	0	0	0	11134

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Battlefield Systems Integration Directorate, Headquarters, US Army Materiel Development and Readiness Command (DARCOM), was established in August 1975 to provide 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 (e.g., fire support, tactical communications, close combat) configured to maximize the combat capability of the force. The process of insuring effective integration of groups of battlefield systems required 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 was supported by analyses 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 enhanced the affordable modernization of Army forces by facilitating the development of effectively integrated groups of battlefield systems.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: Congress eliminated requested funds for PE 6.57.13.A, Battlefield Systems Integration. FY80 efforts, in the absence of funding for contract analyses, were accomplished with in-house resources emphasizing implementation and review of prior analyses. Efforts focused on establishing integration as a key consideration in materiel development planning and decisionmaking. Accordingly, the Battlefield Systems Integration Directorate, Headquarters, US Army Materiel Development and Readiness Command, was disestablished in October 1980. The broad analyses and integration examination functions of battlefield systems integration (BSI) were transferred to the US Army Materiel Systems Analysis Activity, Aberdeen Proving Ground, Maryland.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.17.24.A

DOD Mission Area: #211 - 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	26197	20974	6721	0	0	200348

QUANTITIES

D336	Heavy Antitank/Assault Weapon System (TOW)	26197	20974	6721	0	0	200348

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The TOW (tube-launched, optically tracked, wire-guided) is a long-range antitank/assault guided missile weapon system. The missile is automatically tracked and command guided to the gunner's line of sight. TOW is needed to provide the Army and Marine Corps a long-range (3750 meters) antiaarmor capability. The TOW complements the other antiaarmor weapon systems; i.e., tanks, DRAGON, and LAW to provide the Army and Marine Corps in depth capability to defeat the enemy armor forces. Without the TOW the Infantry and mechanized forces will not have a long-range antiaarmor capability. Improvements are currently in process to improve the performance of TOW against advanced enemy armor.

C. (U) BASIS FOR FY 1982 RDTE REQUEST:

1. Complete development of the full caliber warhead and the electronics and software for the

Program Element: 61.37.24.A
 DOD Mission Area: 4211 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
 Budget Activity: 44 - Tactical Programs

2. The total development costs are valid. The \$200.3 million includes all Research and Development (R&D) costs from the TOW program inception. FY82 estimates have been revised downward by approximately \$10 million since the FY81 submission. Current R&D improvements will prolong the life of TOW when a third-generation weapon system is scheduled to replace it.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission

5" Improved Warhead IOC
 6" Warhead IOC

IOC

Milestone dates shown in FY81 submission were incorrect. The IOC's for the 5" warhead have not changed from the 6" warhead from since they were originally established.

D. (1) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	26197	20974	6721	0	20974
Funds (as shown in FY 1981 submission)	26192	20776	16459	0	209937

Changes in FY82 are: \$6197 in FY80 is actual expenditures; \$20974 is result of inflation increases; \$6721 in FY82 is a revision downward in funding requirements. The change between the FY81 submission and FY82 is mainly due to the revision downward in the estimated FY82 funds required to complete the TOW-2 R&D effort.

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

Program Element: #2.17.24.A
 DOD Mission Area: #211 - Close Combat

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
Missile Procurement, Army (MIPA)						
Funds (current requirements)	28700	91100	99100	100100	318800	6529100
Funds (as shown in FY 1981 submission)	28700	80490	94000	-	297700	6406890
Quantities (current requirements)	6260	12000	12000	12000	36090	222530
Quantities (as shown in FY 1981 submission)	6260	12000	12000	-	36000	219530

The above data list the new procurement program for I-TOW (Improved 5" warhead) and TOW-2 (6" warhead) and also not included is the funding program to retrofit the current inventory of missiles to the I-TOW and TOW-2 configurations. The retrofit programs is shown below:

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
Modifications	25600	196100	113300	58900	36990	66000
Funds (current requirement)						
Funds (as shown in FY81 submission)						
Quantities (current requirement)						
I-TOW (Improved 5")	12940	18000				30940
TOW-2 (6")			9490	9490	16685	30665
Quantities (as shown in FY81 submission)						
I-TOW	Not shown					
TOW	Not Shown					

Program Element: #2.37.24.A
DOD Mission Area: #211 - Close Combat

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

F. (C) 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.

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.A), the Night Observation Device Long Range (NODLR) (PE 6.47.10.A, 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 6.46.20.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
DDO Mission Area: #211 - Close Combat

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

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: The basic weapon system development is completed, and first units were fielded in 1979. 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.

Two Probe contractors, Fairchild and Unidynamics, both qualified as TOW probe contractors. The first improved five-inch warhead was produced by the Iowa Ammunition Plant.

2. (U) FY 1981 Program: Continue the production of improved five-inch warheads for retrofit to existing missile stocks and new production missiles. Continue the accelerated six-inch 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. (U) FY 1982 Planned Program: Produce six-inch warhead missiles and launcher retrofit kits, begin retrofitting existing launchers.

4. (U) FY 1983 Planned Program: Continue net retrofitting current missiles to six-inch configuration and produce new six-inch missiles.

5. (U) Program to Completion: 5787 ground launchers are planned to be modified, and the majority of the missile inventory will be an improved configuration by retrofit and new production program planned for completion in FY86.

FY 1982 RDT&E 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

J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

- a. (U) Development of the TOW Missile System was initiated in October 1963. The prime contractor for TOW is Hughes Aircraft Company (HAC).
- b. (U) Development Test I (DT I) (Engineer Design Tests) started in August 1963 and were completed in March 1967. Major deficiencies with the missile case and missile light sources were discovered during this testing.
- c. (U) DT II (Engineer Test/Service Test) was conducted from December 1966 to 1969. The major deficiencies with the missile case and light source discovered during DT I had been corrected, and no further major deficiencies were discovered.
- d. (U) DT III (Initial Production Test) was conducted from November 1969 to May 1970. This test verified that the hand-tooled production items met production specifications and had the same characteristics as the prototypes.
- e. (U) A night sight program was initiated in 1968 to provide the TOW weapon system with a night fighting capability without the use of artificial illumination. In March 1972, a program was initiated to develop a TOW thermal night sight capable of detecting targets out to the full 3,000-meter range of the system. Prototypes from two contractors, Hughes Aircraft Company and Texas Instruments (TI), entered final competition. Government tests included Laboratory Performance Tests at NVL from 18 February to 27 June 1975, Firing Tests at Redstone Arsenal from 1-22 March 1975, and other systems handling tests held at Redstone Arsenal and Fort Benning. Results of Acquisition Tests during clear weather were Detection, 4,000 meters, and Recognition, 3150-3750 meters. The TI sight won the competition for continued Engineering Development. DT II was conducted by the United States Army Test and Evaluation Command (TECOM) during the period from June 1976 through February 1977. A deficiency in boresighting was discovered. A new boresight collimator was used in Operational Test II (OT II), Phase II, which provided a significant reduction in time required to boresight. DT II was determined by the Department of the Army to be unnecessary and was not conducted. The AN/TAS-4 night sight was type classified standard A in September 1977.
- f. (U) Research was conducted by Hughes Aircraft Company (HAC) from FY 1965 through FY 1971 to provide electronic counter-countermeasures (ECCM) hardening for the TOW system. In FY 1971 Texas Instruments (TI) proposed a Solid State Track Link (SSTL) launcher to provide ECCM hardening for TOW; Development Test I (DT I) tests were successfully conducted in July 1972 using an SSTL launcher and three hardened missiles. An engineering development (ED) contract competition followed with a contract awarded to TI in May 1974. With the addition of the night sight to the TOW system, it was determined that the SSTL

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

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

beacon-tracker link would not penetrate to the extent of the night sight in battlefield obscuration. The SSTL program was terminated by the Army in September 1977. A decision was made to pursue guidance changes that would provide both EOCH hardening and missile tracking range comparable to night sight performance in obscuration.

g. In second and third quarter FY79, studies and flight testing were conducted to determine the feasibility of fitting a probe and larger warhead to the TOW Missile to increase its lethality against the hardening threat. These tests confirmed the feasibility and led to the program to develop improvements in two phases. The first phase, for earliest deployment, includes an improved 5" warhead with probe. The second phase includes a 6" warhead with probe and EOCH hardening of the guidance subsystem.

h. A tabulation of TOW missile test firings follows:

Test programs/Dates	Launches ^{1/}	Functional ^{2/}	Summary of Test Firings			
			No	No	No	No
			Hit	Test	Test	Test
			(1)	(2)	(3)	(4)
Contractor/Before Jul 66	56	38	36	0	0	0
Prototype Test						
Service Test/Jul 66-Mar 67	69	51	49	2	1	0
Missiles						
Engineering/Apr 67-Aug 67	41	27	22	1	2	0
Test/Service Test						
Prior to Aug 67						
Environmental Test						
Tropic/Aug 70-Sep 71	14	14	8	0	5	0
Arctic/Nov 70-Feb 71	28	24	19	3	0	0
Desert/Jun 70-Nov 70	16	14	11	0	0	0

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

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

No No No
Hit Test Test Test

Test programs/Dates	Launches ^{1/}	Functional ^{2/}	(1)	(2)	(3)	(4)
Research Development						
Acquisition Tests						
(RDAT/OT Ia)						
TOW (AN/FAS-4)						
Sight (Stationary & Moving/3-22 Mar 75	35	32	32	0	0	3/
Targets)						
OT II - TOW/Oct-Nov 75	92	75	57	7	9	2 ^{4/}
Night Sight						
SSTL Breadboard/Feb-Mar 75	4	3	3	0	0	0
Firing*						
SSTL Prototype/Jul-Oct 75	5	4	4	0	0	0
Probe flight Test	42	41	40	0	1	0

* due to Beacon Failures

^{1/} number of recorded missile launches during the test.

^{2/} number of recorded missile launches minus reliability failures.

^{3/} Two missed due to "canned" launch shift, one missed due to noise in launcher electronics. No misses were due to the night sights.

^{4/} One hit an obstruction in front of target and one hit wrong target.

Column Notes:

1. Hits are scored on 7.5 x 7.5-ft. stationary targets and 7.5 x 7.5-ft. moving targets.
2. No test was indicated when missiles were fired outside range or environmental requirements.
3. No test due to gunner error, firing through brush, or over water.
4. No test due to other causes.

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

Title: Heavy Antitank/Assault Weapon System (F04)
Budget Activity: #4 - Tactical Programs

2. (U) Operational Test and Evaluation:

a. Two-step program to improve the performance of the TOW antitank guided missile against advanced enemy armor in an EOCM environment is being conducted. The first phase of the upgrading program is an improved five-inch warhead. This will be approximately the same size and weight as the current TOW warhead but will be an improved design to increase its armor penetrating capability. Its Initial Operational Capability (IOC) will be . The second step, called TOW 2, will include a heavier six-inch warhead which even greater armor-piercing capacity. This will occupy the full diameter of the missile body. In addition, the missile guidance system will be improved. The TOW-2 modifications feature a microprocessor-based digital missile guidance set which will provide greater flexibility in guidance programming and higher precision. To compensate for the added weight of the heavier warhead and other missile modifications, the flight motor will be reloaded with an improved propellant to provide a higher impulse. TOW-2 IOC will be .

b. (U) The improved TOW 5" warhead/probe operational test (first step of improved TOW Program) was completed on 25 Jul 80. The test was conducted by MICOM in conjunction with TRADOC and the civilian probe contractors. The objectives of this test were:

- (1) (U) Determine compatibility of improved warhead and probe,
 - (2) (U) Determine if probe deploys and functions,
 - (3) (U) Determine if probe affects trajectory and hit performance,
 - (4) (U) Determine if improved warhead is capable of defeating postulated threat,
 - (5) (U) Determine if improved warhead is sufficiently rugged,
 - (6) (U) Determine if improved warhead fuze is insensitive to Brush.
- c. (U) The results of the 5" warhead/probe operational test were:

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

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

IMPROVED TOW WARHEAD/PROBE

TEST SUMMARY DETAILS

	SUCCESS	FAILURE	NO TEST
STATIC TESTS			
RHA TARGET	86	1	
SV-37 TARGET	92	0	
SLED TESTS			
FAIRCHILD	2	2	2
UNIDYNAMICS	6	4	
FLIGHT TESTS*			
FAIRCHILD - AUG 79	1	3	
- DEC 79 - AUG 80	6	2	2
- JUL 80	33	0	
UNIDYNAMICS - AUG 79	1	4	
- DEC 79 - FEB 80	4	4	2
- JUL 80	31	2	
VIBRATION TESTS (TWO EACH PROBE)	4	0	

* Preflight environmental conditioning consisted of arctic, desert, and temperate.

d. (U) The contract for the assembly of the 5" warhead was let with Hughes Aircraft Corporation (HAC). The 5" improved warhead will be manufactured by the Iowa Ammunition Plant and will be provided as government-furnished equipment to HAC. Since both probes were successful, a request for proposal (RFP) has been offered to both probe contractors, Unidynamics and Fairchild.

3. System Characteristics:

Program Element: 02.17.24.A
DOD Mission Area: 0412 - Close Combat

Title: Heavy Antitank/Assault Weapon System (TOW)
Budget Activity: 04 - Tactical Programs

<u>Operational/Technical</u> <u>Characteristics</u>	<u>Objectives</u>	<u>Demonstrated</u> <u>Performance</u>

Range
Minimum
Maximum
With Night Sight
Probability of a Kill
given a Hit
System Reliability
Probability of a Hit
given a reliable
Round-Stationary Targets
Moving Targets
Using Night Sights
against Stationary Targets

5/

- 1/ (U) Developmental and Operational Firings.
2/ (U) Sight is in production.
3/ (U) Analytical Data.

4/ (U) TOW's Probability of Hit given a Reliable System is higher than predicted. Overall mission accomplishment or probability of a first hit is computed by multiplying probability of hit given a reliable system by system reliability. Overall mission accomplishment is higher than the requirement, and therefore the Army accepts the demonstrated reliability.

5/ (C) Hitting performance during the combined Research Development Acquisition Tests (RDAT)/Operational test 1a, with user troops, was

4. (U) Current Status: The TOW Missile System is a mature system; therefore only the approved 5" TOW is addressed. This test and evaluation data sheet will require updating when TOW-2, currently in the development and testing phase, goes into production.

FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2, 37, 26, A

Title: Advanced Field Artillery Tactical Data System

DOD Mission Area: #212 - Fire Support

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable 4
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	-	3560	6079	12165	Continuing	Not Applicable
D322	Advanced Field Artillery Tactical Data System	-	3560	6079	12165	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 field artillery functions of providing continuous and timely target servicing, counterfire, and interdiction fires to the maneuver forces. The Field Artillery Tactical Fire Direction (TACFIRE) automated command and control system greatly increases the effectiveness of our forces; however, because of the age of the technology, a successor system development is required to continue providing the capability to defeat the threat envisioned for the late 1990's. This new system must provide for improved communications management, distributed processing at remote locations, and increased system mobility and survivability. The new system will take full advantage of current and near term hardware technology, such as interactive graphic displays, to substantially ease training and improve operability. It will incorporate standardized, smaller, less costly and more reliable processors and remote terminals to allow distribution of currently centralized functions, and provide a reduction in the physical size of the artillery command and control centers thereby enhancing survivability in the tactical field artillery environment.

C. (U) BASIS FOR FY 1982 REQUEST:

1. (U) The system engineering contractor will complete functional analyses and specifications for the total system and the remote terminal subsystem. Brassboard model fabrication of the communications control subsystem (CCS) for the FY83 user testbed will commence. The CCS is a module which matches protocol and transmission rates of a message to the communication system over which the message will be transmitted. Development of system level software for the testbed tests of the CCS will be started. Development of the remote terminal subsystem will also be initiated.

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Program Element: #2.37.26.A
 DOD Mission Area: #212 - Fire Support

Title: Advanced Field Artillery Tactical Data System
 Budget Activity: #4 - Tactical Programs

2. (U) The R&D costs of each subsystem of the new system are validated engineering estimates based on recent developments of items of similar complexity. The developer is confident that the cost estimates accurately reflect the resources required to support the proposed developments. In-depth cost analysis for each subsystem will be performed during the first year of the system design effort.

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
Mission Element Need		
Statement Approval	2Q81	3Q80
In Process Review (IPR) (CCS)	3Q81	1Q81
Contract Award	4Q81	3Q81
Development Test (DT)/		
Operational Test (OT) II	3Q86	3Q84
Development Acceptance		
In Process Review (DEVA IPR)	4Q86	2Q85
Initial Operational		
Capability (IOC) (CCS)	1Q89	4Q86
Army Systems Acquisition		
Review Council I (ASARC)/Defense		
Systems Acquisition Review Council I		
(DSARC) (Remote Devices)	3Q82	4Q81
Contract Award	4Q82	1Q85
DT/OT II	3Q87	3Q85
ASARC III/DSARC III	4Q87	2Q89
IOC (Remote Devices)	3Q90	3Q91

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Program Element: #2.17.26.A
 OOD Mission Area: #212 - Fire Support

Title: Advanced Field Artillery Tactical Data System
 Budget Activity: #4 - Tactical Programs

Major Milestones	Current	Milestone Dates
	Milestone Dates	Shown in FY 1981 Submission
ASARC I/DSARC I (Fire Direction Center (FDC) Upgrade)	3Q82	4Q86
Contract Award	1Q85	3Q87
DT/OT II	3Q88	4Q89
ASARC III/DSARC III (FDC Production Decision)	4Q88	4Q90
IOC (FDC Upgrade)	3Q90	3Q93

The schedule changes resulted from the redistribution of funds, with more money available earlier, particularly FY83 and FY84. Although the Communication Subsystem Initial Operating Capability (IOC) has been delayed, the IOC dates for the remote terminal and Fire Direction System (FDC) subsystems have been moved up significantly and aligned to permit simultaneous fielding of the new equipment.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	-	3560	6079	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	-	3527	5127	Continuing	Not Applicable

The change in funds reflects adjustment for current inflation indices and civilian pay increases.

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

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Program Element: #2.37.26.A
 DOD Mission Area: #212 - Fire Support

Title: Advanced Field Artillery Tactical Data System
 Budget Activity: #4 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	-	-	-	-	763000	763000 ^{1/}
Funds (as shown in FY 1981 submission)	-	-	-	-	482100	482100
Quantities (current requirements)	-	-	-	-	139	139 ^{1/}
Quantities (as shown in FY 1981 submission)	-	-	-	-	73	73
Military Construction, Army:						
Funds (current requirements)	-	-	-	-	3100	3100 ^{2/}
Funds (as shown in FY 1981 submission)	-	-	-	-	3100	3100

^{1/} (U) The increase in quantity and OPA funds results from the approval of the reprogramming request to continue production of the current TACFIRE to equip the total Active Force. The current quantity and costs reflect replacement of TACFIRE with the new system for the total Active Force. A decision on fielding the new system to the reserves is deferred to a later date.

^{2/} (U) 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 space for 90 additional personnel. The space and vault are necessary for the TACFIRE Software Support Group at Ft. Sill, OK.

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Program Element: #2.37.26.A
DOD Mission Area: #212 - Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Army is fielding an automated Tactical Fire Direction System (TACFIRE) to provide accurate, responsive, effective utilization of US Artillery which is numerically inferior to that of our potential adversary. The user has identified a requirement for a replacement system for the 1990's that must incorporate three specific improvements, all of which are supportable with technology projected to be available in the near term. In order of priority, these requirements are: (1) better communications management, (2) the availability of data processing capability at remote locations, and (3) a reduction in the size and weight of the Fire Direction Center (FDC) subsystem. This program will field a new system to replace TACFIRE, meeting all the new user requirements. The new system will employ a front end communications processor which will handle a variety of communications message structures, speeds, modulation types, error correction coding, security, and communications media; i.e., radio, wire line, switched system and dedicated data systems such as the Position Locating and Reporting System/Joint Tactical Information Distribution System Hybrid. Current microprocessor technology will allow placing these parameters under software control, thus providing operational flexibility to efficiently match all emerging communications and sensor systems. The techniques and characteristics required to significantly enhance artillery tactical communications net management must be finalized and demonstrated prior to completing the balance of the system design. Since this subsystem must therefore be developed early, it is possible to utilize this part of the new capability to upgrade the current TACFIRE to improve its tactical communications net management requirements until the full successor system can be fielded. The user's requirement for data processing at remote locations will be accommodated with the continuing technological advances in the areas of processors and displays resulting in significant improvements in size, cost, and reliability. In order to further reduce system cost and logistics, the new standard military computer family processor and memory now under development will be used for the intelligent remotes and the Fire Direction Centers. These new remote subsystems will increase overall system survivability by physically distributing the data base and processing locations, and improve system responsiveness by providing the necessary processing capability to the Fire Support Officer (FSO) who must support the Infantry maneuver commander. Interactive graphics will be used throughout the new system to alleviate operation and training shortcomings of the current system. Finally, improved reliability, ruggedness, and reduced size of new support subsystems should make it possible to configure the new FDC's in vehicles common to the supported forces. When completed, the replacement system will be entirely new, utilizing applications software evolved from the current proven TACFIRE system. The modification and recoding of the current and ongoing software enhancements of the TACFIRE application software will be accomplished by the existing TACFIRE post-deployment software support group. All contracts for subsystem hardware will be awarded competitively. Fully competitive production procurement data packages will be procured for each subsystem.

G. (U) RELATED ACTIVITIES: The following provides information on current US and foreign development efforts which may be applicable to this program:

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Program Element: #2.37.26.A
DOD Mission Area: #212 - Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: #4 - Tactical Programs

1. (U) A standard, 32-bit militarized computer is being developed in Program Element (PE) 6.27.46.A, Tactical ADP Technology, Project A09400, Military Computer Family, and PE 6.37.23.A, Command and Control, Project D180, Military Computer Family. This computer is scheduled to enter production in FY86 and, when available, will be used to replace the current TACFIRE processor (AK/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 new 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 new system. 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 and for the program support efforts such as systems engineering and verification and validation. The in-house developing agency is the US Army Communications Research and Development Command (CORADCOM), Ft Monmouth, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Not Applicable

2. (U) FY 1981 Program: A systems engineering contract will be awarded to analyze the user's needs, develop supporting rationale for required functional and material changes to meet those needs, and define subsystem electrical and software in-

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interface requirements. The contractor will prepare technical documentation for individual subsystems, starting with the communications control subsystem. A contract for the communication subsystem will be awarded. System software modifications will be initiated to permit a user testbed evaluation in FY83.

3. (U) FY 1982 Planned Program: The systems contractor will continue to analyze user needs, concentrating on the detailed functional characteristics of the new "intelligent" terminals to increase the system's responsiveness to the commander's needs. The communication control subsystem contractor will begin assembly of a brassboard model which will be incorporated in a testbed planned for mid-FY83. A contract will be awarded for a software verification and validation effort.

4. (U) FY 1983 Planned Program: System design and analysis of testbed results of the brassboard model of the Communications Control Subsystem will be completed. Engineering design specifications for the engineering development models will be completed and the contract for the production of the engineering development models awarded. Hardware and software development for the intelligent remote terminal subsystem brassboards will continue. Design requirements for the Fire Direction Center subsystem will be initiated based on cost/performance/risk trade-off analysis and a continuing assessment of available and projected near-term technology.

5. (U) Program to Completion: The systems contractor will continue to define the details of the functional and material improvements to be made to the field artillery communications control function 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 testbed 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 testbed for automated systems at Ft Hood, TX.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.30.A

DOD Mission Area: #213 - Ground Air Defense

Title: CHAPARRAL

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	6052	23172	20074	14617	14465	162975
	QUANTITIES						
	Fire Units						5
	Missiles						163
D697	CHAPARRAL	6052	23172	20074	14617	14465	162975

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the development of missile, weapon system and ground support equipment improvements for the CHAPARRAL weapon system. CHAPARRAL is a short-range air defense (SHORAD), surface-to-air missile system. It is a highly mobile self-propelled system; the missile is a lightweight supersonic, passive infrared homing, fire-and-forget missile. CHAPARRAL is effective against all types of aircraft at low altitude; however, operation is limited to clear-day conditions by the need for visual target acquisition and identification by the gunner. The system has been operationally deployed since 1969; it is the only SHORAD missile system currently in the field. It provides air defense for infantry, mechanized infantry and armor divisions and for theater/corps rear areas. Even should ROLAND be procured and replace some CHAPARRAL weapon systems for theater/corps area air defense in, CHAPARRAL will be retained as the Army's divisional SHORAD missile system thru the 1990's. To enable CHAPARRAL to meet the postulated threat thru the 1990's, critical system improvements which include the capability to engage targets at night and to engage targets employing are required.

C. (U) BASIS FOR FY 1982 RDTE REQUEST:

1. Funds are requested to continue the development of an improved guidance section for the CHAPARRAL missile. The improved guidance section, based upon the Passive Optical Seeker Technique (POST) Rosette Scan guidance concept under development for STINGER, will enable the system to operate

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2. Estimated cost to complete development of the CHAPARRAL weapon system is for development of approved system modifications, a Forward Looking Infrared (FLIR) night sight to provide CHAPARRAL a night engagement capability and the improved POST guidance section. The POST guidance section development program is being re-evaluated. The "Total Estimated Cost" for CHAPARRAL development may change as a result of this evaluation effort.

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
CHAPARRAL ROTE 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)	November 1974	November 1974
Type classified standard		
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	March 1980
Initial Operational Capability (IOC) for Improved CHAPARRAL Missile (less Smokeless Motor)	1QFY1979	1QFY1979
IOC Smokeless Motor		

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Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
IOC Identification Friend or Foe (IFF)		
IOC Forward Looking Infrared (FLIR)		
Subsystem		
Initial Operational Capability (IOC)		
POST Rosette		

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	6052	23172	20074	29082	162975
Funds (as shown in FY 1981 submission)	6052	20590	19003	13825	144145

FY 1981 funds are those required to complete development of the Forward Looking Infrared (FLIR) night sight, to initiate development of a Passive Optical Seeker Technique (POST) missile guidance section, to study possible improvements for the Forward Area Alerting Radar (FAAR) and to investigate the adaptation of Navy developed Rolling Airframe Missile (RAM) technologies to CHAPARRAL. The increase in FY 1981 funds reflects cost changes due to inflation and the addition of the programs to study possible FAAR improvements and to investigate adaptation of Navy RAM technologies. FY 1982 funds are required to continue development of the POST guidance section. The increase in "Additional to Completion" funds reflects funding to complete development of the POST system, this requirement was unfunded last year. The "Total Estimated Cost" increase includes the additional funds programmed to complete POST system development, the FY 1981 inflation factor, and for the additional FAAR and RAM studies in FY 1981.

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Missile Procurement, Army						
Funds (current requirements)	3200	44400	4400	4500	14100	519900
Funds (as shown in FY 1981 suballocation)	3200	3400	3600		251400	713600
Quantities (current requirements)						
Missiles	0	0	0	0	0	13320
Fire Units	0	32	0	0	0	532 (12 sold to Israel)
Quantities (as shown in FY 1981 suballocation)						
Missiles	0	0	0	0	3000	16320
Fire Units	0	0	0	0	0	500 (12 sold to Israel)

Additional funds provided in "FY 1981" to procure 32 fire units for repair cycle float program. Application of new inflation indices caused increases in previous estimates for funds required for "FY 1981," "FY 1982," "Additional To Completion" and "Total Estimated Cost". Additional funds are reflected for the "FY 1982," "FY 1983," "Additional To Completion" and "Total Estimated Cost" vis a vis previous estimates to support missile disassembly/assembly operations associated with the smokeless motor replacement program. Additional funds are reflected for "Additional To Completion" and "Total Estimated Cost" fund estimates as the result of adding a procurement estimate for 524 additional smokeless motors in FY86. A decrease in "Additional to Completion" and "Total Estimate Cost" funds resulted from the deletion of a FY 1986 3000 CHAPARRAL missile procurement program.

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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 currently being produced. The smokeless motors are being purchased and fitted to CHAPARRAL missiles as the shelf life of original motors is reached. 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 much increased 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

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A development effort for this improvement should be initiated in FY 1981. Also in FY 1981, a study will be done to identify possible improvements for the Forward Area Alerting Radar (FAAR) and the use of Navy developed Rolling Airframe Missile (RAM) technologies for an advance CHAPARRAL will be evaluated.

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 1980 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 a
GOLDEN also provided some capability against;

Following a firing program and refinement of the design, GOLDEN was incorporated into the Improved missile

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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 completed in February 1980. 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 demonstrator program to provide a hedge against ROLAND technical and funding problems. The program was completed on schedule in July 1979. The FY 1980 program focused 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 sensors and imaging unit, controls, visual target display, autotrack circuit and system interfaces, was initiated. Necessary changes to the system's field maintenance test equipment were identified, and the required design, development, and documentation of these changes initiated. Fabrication, assembly, and integration were initiated for six prototype fire units with FLIR subsystems and three modification kits for the system's field maintenance test equipment. Contractor tests were also started. The logistics support and reliability and maintainability and the government test plans were initiated.

2. (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 initiated. 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.

3. (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 compatibility of

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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.

4. (U) FY 1983 PLANNED PROGRAM: In early FY 1983, prototype POST guidance sections will be subject to environmental and flight testing by the contractor. Following those contractor tests, preproduction guidance sections will be fabricated for environmental flight and operational tests by the government beginning in late FY 1983.

5. (U) Program to Completion: The development of the POST 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 (DT II/OT II). The major government effort will be to conduct the DT II/OT II. 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 LAU-7A Launch rails installed on the M45 mount, and SIDEWINDER IC 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

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all phases of MPT/KDT. Fourteen firings were conducted,
and maintainability goals had been established at the time of this test phase.

No reliability, availability,

b. 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) 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. 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 MIN-72C Improved CHAPARRAL missile was developed to alleviate technical limitations in the MIN-72A basic version, limitations which were known at the time the system was designed. The improvements incorporated by the

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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. 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, had essentially

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.

All 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 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

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development effort was undertaken for that purpose. Five additional firings were conducted by White Sands Missile Range in connection with this effort, of which were successful and confirmed predictions of improved performance over GOLDEN I.

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

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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. 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

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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 demonstration 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 was 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

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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:

(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.

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2. Operational Test and Evaluation: The US Army Operational Test and Evaluation Agency (OTEA) conducted Operational Test II (OT II) of the HIM-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 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 OT II/OT II, the decision was made to classify the missile standard. The firing phase was planned to consist of 14 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.

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3. System Characteristics:

<u>Operational/Technical Characteristics</u>	<u>Objectives</u>	<u>Demonstrated Performance</u>
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		Met
Energize System from Standby		Met
Crew Size	Operate by one man; five man crew.	Met
Reload (rounds/minute)		Met
Emplacement Time	45 seconds	Met
Launching Station Weight (empty)	10,000 pounds.	8,726 pounds
Minimum/Maximum Intercept Range	MIM-72A: MIM-72C:	Met

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<u>Operational/Technical Characteristics</u>	<u>Objectives</u>	<u>Demonstrated Performance</u> ^{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)		MIM-72A: MIM-72C:

(u) 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.

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9905	7482	19558	38607	42946	313368
	QUANTITIES						
	Missiles/Ground Support Equipment Sets						55/2
699	Surface-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)	9905	7482	19558	38607	42946	313368

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 and to phase into its role of Patriot support in the late 1980's.

C. BASIS FOR FY 1982 RDTE REQUEST: Funds in the amount of \$39.558 million are required in FY82 in support of upgrading the Improved HAWK Missile System. Development and testing are required to verify interoperability, to complete the development effort on the Missile Electronic Countermeasures (ECM) Upgrade Product Improvement (PIP), to continue development of the

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missile's ability
discussed below.

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and initiate development of the other Phase III PIP's which are

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
Engineering Development Contract Awarded	November 1964	November 1964
Initial Operational Capability	November 1972	November 1972

I.D. COMPARISON WITH FY 1981 RDTE REQUEST (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	9905	7482	34558	81553	313368
Funds (as shown in FY 1981 submission)	10097	7412	1919	39046	235432

The change in Total Estimated Cost between FY81 to FY82 submissions is \$78 million. Breakout is as follows: Decrease of \$0.192M in FY80 caused by reprogramming to higher priority Army requirements; increase of \$0.070M in FY81 caused by inflation. Increase of \$33.639M in FY82 due to OSD plus-up and FY82 amended budget to initiate development of life extension Phase III PIP's. Increase of \$42.507M for "Additional to Completion" (FY83-85) due to OSD plus up to complete development of Phase III PIP's. Validity of the "Total Estimated Cost" is considered good. Based on the currently planned phase-out dates of IHAWK by end the forecast calls for no planned increases.

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Missile Procurement, Army:						
Funds (current requirements)	32500	10000	4700	4100	8400	996200
Funds (as shown in FY 1981 submission)	36500	10000	4500	Not shown	11700	1000100
Quantities						
Missiles/General Support Equipment Sets (current requirements)	197/0	0/0	0/0	0/0	0/0	5328/98
Missiles/General Support Equipment Sets (as shown in FY 1981 submission)	197/0	0/0	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 1981 submission)	0	0	0	0	0	1300

(1) \$4.0 million saved by diverting Foreign Military sales equipment for Iran to the US Army. As a result, only 16 new Improved Hawk missiles were bought in FY80 to satisfy the requirement for 197.

(2) Change in FY82 due to inflation.

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Program Element: #2.37.31.A

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

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Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Technical assessments and operational testing confirmed the deficiencies in the Basic HAWK System to meet the air threat. 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 provides a significant increase in HAWK System effectiveness due to a new missile, reduced reaction time by the addition of a computer, and electronic warfare counter-countermeasures. Modifications to the various radars and other ground support equipment were also developed to incorporate built-in test equipment and to achieve compatibility with the new missile and computer. A Product Improvement Program (PIP) was initiated in FY73. The first set of PIP's (Phase I) corrects significant field problems and enables the system to meet its threat requirements into the 1980's. Follow-on development of product improvements (Phase II PIP's) was initiated to increase system effectiveness and performance. Further development (Phase III PIP's) is planned in order for Improved HAWK to meet its role of Patriot support in the late 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-46) for HAWK is part of a National Defense Program (Program Element #6.47.09.A, Program Number D530, 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 is nearing completion, and NATO is initiating production of Improved HAWK Phase I product improvements. 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; Applied Devices Corporation, Hauppauge, NY; and Northrop Corporation, Anaheim, CA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

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Program Element: #2.3/31.A

DOD Mission Area: #213 - Ground Air Defense

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

Budget Activity: #4 - Tactical Programs

1. FY 1980 and Prior Accomplishments: The HAWK Improved 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 Improved HAWK missile. A combined Development Test III/Operational Test III (DT III/OT III) was conducted from May through July 1972 and led to a decision to field the Improved HAWK System. The first battalion's formal Initial Operational Capabilities (IOC) was 10 Nov 72. A Product Improvement Program (PIP) to correct field problems and to meet threat requirements into the 1980's was initiated in FY73. By FY77 development was completed on four improvements (Phase I): (1) An upgrading of the reliability, availability, and maintainability (RAM) of the Improved Continuous Wave Acquisition Radar (ICWAR); (2) Improving the performance of the Improved Pulse Acquisition Radar (IPAR) to acquire targets in a high-clutter environment; (3) Increasing the computer memory of the Automatic Data Processor (ADP) to handle more target track information in a timely fashion, to give a complete picture of the air situation, and to greatly reduce the time it takes the Improved HAWK battery to react to presence of attacking aircraft (this improvement also includes digital computer-to-computer interface with the AN/TSQ-73 Air Defense Command and Control System); and (4) providing each battery with a multichannel communications capability. Later in FY77, these product improvements were released for production, and delivery to units in the field began in FY79. A second series of PIP's (Phase II) is focusing on four improvements to upgrade system effectiveness and performance: (1) providing an optical tracking capability; (2) making RAM and emissions control (EMCON) improvements to the Improved HAWK tracking radar (i.e., Improved High Power Illuminator (IHPI)); (3) enhancing the missile's capability to counter enemy jamming techniques; and (4) upgrading the tactical software. The PIP name for the optical tracking capability is Tracking Adjunct System (TAS). TAS is an alternate tracking mode that can be used in an Electronic Countermeasures (ECM) environment or when normal tracking cannot be accomplished. TAS was tested in Europe in FY78, and problems were identified that required redesign of some hardware components and changes to factory procedures. In FY80, testing of the redesigned TAS kits was completed and the kits placed under contract. Development of the RAM/EMCON improvements to the tracking radars is continuing. Technical problems encountered in the preproduction models have delayed starting initial developmental and operational testing from FY79 to FY81. The new version of the tactical software, called Block 10, was developed and successfully tested in a three-battery test in FY79. The lessons learned from this test resulted in further refinements to the software and a revised version (Block 11) evolved. Block 11 software, which will have the capability of reporting selective data from the acquisition radars, as well as all data from the tracking radars, continued development in FY80. The product improvements to the Improved HAWK missile performance in an ECM environment were initiated in FY79 and are continuing. Long-lead items will be procured in FY81. On 15 April 1980, the United States Army Missile Command (USAMICOM) completed a study of what additional improvements beyond Phase I and II are required for Improved HAWK to effectively phase in its role of augmenting the air defense capabilities of the Patriot weapon system in the late 1980's. The study recommended the

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development/fielding of six additional improvements called Phase III: (1) giving the IHAWK missile the ability to counter the Multiple Blinking Jammer (MBJ); (2) increasing the computer capability of the command post that controls the missile engagements of each firing section; (3) providing the Improved HAWK battery with improved firepower capabilities against low-altitude targets; (4) providing 100% solid state components to the tracking radars to further improve reliability, availability, and maintainability; (5) fielding a new Trainer/Simulator; and (6) incorporating either active or passive continuous wave decoys as an Antiradiation Missile (ARM) diversion against the threat projected for the late 1980's. During the formal PIP review process in December 1980, the continuous wave decoy improvement was not supported by the US Army Training and Doctrine Command (TRADOC) and has been deleted from the PIP list.

2. FY 1981 Program: Continue development of the Phase II missile ECM improvements and demonstrate whether engineering is reasonably complete and all significant design problems are solved. Conduct Product Improvement Verification Testing (PIVT) of the tracking radar's RAM/EMCON improvements to insure suitability for Army use. Conduct a European four-battery test of the Block II software and complete its development. Initiate work on the missile improvement. Procure 687 replacement rocket motors.
3. FY 1982 Planned Program: Complete development of the Phase II missile ECM improvements. Conduct testing to validate that the missile ECM and optical tracking improvements are ready for Army employment. Continue development of the missile modification. Initiate development of the other Phase III improvements. Procure 738 replacement rocket motors.
4. (U) FY 1983 Planned Program: Start fielding of the Phase II missile ECM modification. Award long-lead contracts for the Phase III improvements.
5. (U) Program to Completion: Complete fielding of the Phase II missile ECM modification. Complete development/fielding of the Phase III improvements.

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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 Co., 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 1980 follows:

	Dates	Attempted Firings ^{6/}	Successful Flights ^{7/}	Unsuccessful Flights	No Test
Development/ Aug 67					
Operational Test/Product Improvement	Jul 74	171 ^{3/}	97	56	18
Lot Acceptance Test	Apr 72	136	121	10	5 ^{4/}
Annual Service Practice	Continuing May 74	551	419	73	59 ^{5/}
	Continuing				

(U)1/ Successful flights were those in which the test objectives were met.

(U)2/ 753 of these launches were in a tactical configuration and resulted in 580 successful flights, 97 failures, and 74 no test.

(U)3/ These firings were to test missile design and modifications and were of several configurations to support differing test objectives.

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- (u) 4/ Three no tests were the result of missile limitations and two others were attributed to failure in ground support equipment (GSE).
- (u) 5/ No test categories included 27 GSE failures, 4 misfires, 9 range safety actions, 15 design limitations, 2 personnel errors, and 2 telemetry failures.
- (u) 6/ Recent review of all flight records indicated that some development test/operational test missiles were scored in more than one category. Flight test missiles have now been recategorized to eliminate duplication.
- (u) 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 for 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 the test measured system performance and used approximately sixty aircraft tracking missions, 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. Initial production tests of these modifications were completed in June 1979, and items were released for issue in August 1979. The optical tracking adjunct system was subjected to further testing in Europe from January thru May 1979. 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 led to a production decision in FY80. Initial production tests of TAS are scheduled to begin in FY81. Development of RAM and emissions control for the High Power Illuminator (HPI) is continuing. Technical problems encountered in the preproduction models caused initial production to be delayed. Production improvement verification tests are now scheduled in FY81. Block 10 software was tested in FY78 and FY79, and was approved for tactical use in August 1979. A CONUS 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. In June and July 1980, the Block 10 software was successfully integrated and demonstrated in a tactical battalion in USAREUR.

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DOD Mission Area: #213 - Ground Air Defense

Budget Activity: #4 - Tactical Program

2. (U) Operational Test and Evaluation: The Improved HAWK Initial Operational Test and Evaluation (IOTE) was conducted May through July 1972 at McGregor Range, New Mexico. Typical military personnel conducted round-the-clock operation of the equipment, engaged 405 live aircraft tracks and conducted live firings. Thirty-seven minor deficiencies were discovered during test. These minor deficiencies have since been corrected. Reliability failure in three 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. Twenty-three 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.

Program Element: #2.37.31.A

DOD Mission Area: #213 - Ground Air Defense

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

Budget Activity: #4 - Tactical Program

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-Electronic

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)^{2/}

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

Operational/Technical
Characteristics

Objectives

Demonstrated
Performance 1/

Single Target (ECM deception)
Single Maneuvering Target 1/
Inherent System Effectiveness (ES)
(Single Target, no ECM)-

(u) 1/ Improved HAWK test reports through 20 September 1980.
2/1

-) 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.
- (u) 5/ Inherent availability and effectiveness do not include actual support environment.
- (u) 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 14 live lot acceptance firings against multiple targets.
- (u) 7/ PSSK based on 13 live firings during lot acceptance tests.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.35.A
 DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
 Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	4704	20631	29485	27661	Continuing	Not Applicable
DE01	M60A1 Tank Product Improvement Program (PIP)	4704	4609	0	0	0	55831
D330	M1 Tank Improvements	0	16022	25246	15189	Continuing	Not Applicable
D332	Fighting Vehicle Improvements	0	0	4239	14324	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The acceleration of technology plus the rapid pace of the Soviet modernization efforts emphasize the need for an evolutionary block improvement program to maintain the M1 and Infantry/Cavalry Fighting Vehicles (IFV/CFV) combat advantage over future Soviet armor. This program provides for early initiation of planned M1 and IFV/CFV operational performance and reliability, availability, maintainability and durability (RAM-D) improvements beyond the original performance requirements, responsive to future threat changes, and technology opportunities. It also provides for completion of the development of M60 tank training devices designed to maintain crew proficiency at a high level throughout the training cycle.

C. (U) BASIS FOR FY 1981 RDTE REQUEST: Requested funds will provide for development, engineering and testing of improvements and additions to the M1 and IFV/CFV systems. Improvements for the M1 include improved Nuclear, Biological and Chemical (NBC) Protection, an Auxiliary Power Unit (APU), upgraded armor and weight reduction. IFV/CFV improvements relate to NBC Protection, Driver's Thermal Viewer, Improved Swim Barrier, Heading Reference Unit (HRU), and Improved Fire Controls. Completion of M60 Training Devices is also included.

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Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Training Devices		
M60A3 Unit Conduct of Fire Trainer (UCOFT)		
DT/OT II Completed	2QFY82	1QFY82
Production IPR	4QFY82	3QFY82
M60A3 One Station Unit Trainer (OSUT)		
DT II Completed	2QFY82	1QFY82
OT II Completed	2QFY82	1QFY82
Production IPR	4QFY82	3QFY82
M60A1 UCOFT		
Brassboard Test	2QFY82	1QFY82
DT II Completed	2QFY81	2QFY82
OT II Completed	2QFY82	2QFY82
Production IPR	4QFY82	3QFY82
Adaption Hardware		
DT/OT II Completed	1QFY81	3QFY80
Production IPR	2QFY81	4QFY80
Auto Fire Extinguisher		
DT/OT II Completed	1QFY81	3QFY80
Production IPR	2QFY81	4QFY80

Reason for change: Addition of IFV/CFV trainers resulted in reassessment of total program and a one quarter delay in M60 trainer milestones. Higher priority M1/IFV/CFV system tests delayed completion of adaption hardware and fire extinguisher test milestones.

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Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activity: 44 - Tactical Programs

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	4704	20631	29485	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	6000	14248	19399	Continuing	Not Applicable

FY80 change is due to reprogramming of funds into higher priority program requirements. FY81 and FY82 changes are result of FY81 Supplemental/FY82 Amended Budget.

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
Weapons and Tracked Combat Vehicles						
Procurement, Army:						
Funds (current requirements)	135000	146300	199500	284000	661200	198200
Funds (as shown in FY 1981 submission)	117400	99300	160900	Not Shown	89900	776700
Quantities (current requirements):						
Modification kits -		Not Applicable				
Quantities as shown in FY 1981 submission)		Not Shown				

FY81 and FY82 changes are a result of FY81 Supplemental/FY82 Amended Budget.

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Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

F. (U) **DETAILED BACKGROUND AND DESCRIPTION:** The rapid modernization of Soviet Armor 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 the correction of operational deficiencies in our present M60 series tanks, fielding the M1 tank and IFV/CFV as soon as possible. Introduction of subsequent M1 and IFV/CFV operational performance and RAM-D improvements are essential to maintain technological parity for the 1980's and beyond. The M1 and IFV/CFV will revolutionize the way Armor, Infantry, and Armored Cavalry units fight the next war. Although the M1 and IFV/CFV represent the latest in technology advances in crew protection, firepower, and mobility, they were designed with growth potential in mind that maintains their combat advantage and reduces their logistic burden. The M1 and IFV/CFV Product Improvement Programs (PIP's) will introduce time-phased product improvements to the production lines in groups called "Packages" to minimize cost while insuring effective configuration control. Four packages are currently planned for introduction into production in FY85, FY86, FY87, and beyond. The M1 FY85 package includes a Chemical Agent Alarm, Inertial Dust Separator, a Hybrid NBC (overpressure) System, a companion Auxiliary Power Unit (APU), upgraded armor and weight reduction and a Heading Reference Unit (HRU) for the IFV/CFV. The FY85 IFV/CFV package contains a Heading Reference Unit (HRU). The FY86 package incorporates into IFV/CFV a Driver's Thermal Viewer, an Improved Swim Barrier, as well as improved fire controls. The FY87 package for the M1 includes an Improved Commander's Weapon Station with a new independent Commander's and Driver's Thermal Viewer, Heading Reference System, Improved Rangefinder, and for IFV/CFV an NBC Protective System. The TBD package provides the M1 with signature suppression improvements, ballistic overhead protection, an automatic muzzle reference system, and improved ability to engage evasive targets. These packages will significantly enhance the M1 and IFV/CFV survivability, fightability, and overall combat effectiveness on the battlefield. Packages beyond FY87 will be responsive to threat and technology 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 (ILS) problems.

(U) The M60 series tank is currently in the last of its three-phased product improvement program and except for M60 trainer efforts will be completed during FY 1981. Work to be accomplished includes improvements related to adaption hardware and the automatic fire extinguisher. The M60 trainers will be developed jointly with the M1 trainers. These will include: 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, and a ten-station gunnery simulator for training large numbers of armor crewmen in basic and advanced gunnery skills.

G. (U) **RELATED ACTIVITIES:** Related, but nonduplicatory, Army activities being conducted are as follows: Program Element

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Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

(PE) 6.46.20.A-DG20, M1 Tank System; PE 6.46.16.A, Fighting Vehicle Systems (FVS); 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 6.47.25.A, Collective Protective Materiel; PE 6.36.31-D014, Combat Vehicle Turret and Chassis.

II. (U) WORK PERFORMED BY: In-house efforts on this program are accomplished by the Project Managers for M1, IFV/CFV, 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 Command, Warren, MI; and 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, Muskegon, MI; Texas Instruments, Dallas, TX; Minneapolis Honeywell, St. Petersburg, FL, and Solar International, San Diego, CA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Development work on M60 Adaptation Hardware, Automatic Fire Extinguisher, and Training Devices continued.

2. (U) FY 1981 Program: Initiated RDTE for high priority M1 PIP's.

a. (U) Nuclear, Biological and Chemical (NBC) Improvements: Initiated contract development of Inertial Dust Separator, installation of a Chemical Agent Alarm, and Improved Materials resistant to decontaminating agents. Initial hardware delivered for subsequent FY82 test.

b. (U) Auxiliary Power Units: Provides for on-board electrical power source other than the main engine. This enhances the tank's silent watch capability and reduces fuel consumption by approximately 1000 gallons per year in peacetime. Also aids starting main engine at -65 F. One unit tested on an M1 at Arctic Test Center. Five units delivered for FY82 vehicle testing.

c. (U) Ballistic Armor Improvements: Provides for upgraded protection to meet Warsaw Pact weapon and munition improvements. Initiated integration and testing of armor improvements.

d. (U) Weight Reduction: Offsets weight growth due to current and possible future improvements. Minimum weight reduction goal is .75 tons and will be achieved through changes to the production process and redesign of selected low-risk components.

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Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

*Note: WTCVA Funded.

3. (U) FY 1982 Planned Programs: Complete testing of M60 trainers and make production decisions.
 - a. (U) Initiate MI system integration engineering efforts for the following improvement capabilities funded in FY81:
 - (1) (U) Nuclear, Biological, and Chemical NBC Protection Improvements (near-term): Begin testing of inertial dust separator, chemical agent alarm, and improved materials to improve decontamination results.
 - (2) (U) Auxiliary Power Unit: Conduct Development Test/Operational Test (DT/OT) II.
 - (3) (U) Ballistic Armor Improvements: Continue armor improvements for M1E1 necessary to maintain parity with Soviet tank devices.
 - (4) (U) Weight Reduction: Continue weight reduction efforts.
 - (5) (U) Commander's Weapon Station with Thermal Viewer: Provides greater visibility command and control under "dirty battlefield conditions" and night operations. Initiated contract for delivery of hardware for FY82 testing.
 - (6) (U) Driver's Thermal Viewer: Provides for greater visibility and target acquisition on the "dirty battlefield" and/or for night operations; conducted installation check test during advanced development prototype provided by the Night Vision and Electro-Optical Laboratory.
 - (7) (U) Heading Reference System: Begins integration of a Heading Reference Unit (HRU) to assist crew in navigation at night or under reduced visibility conditions.
 - (8) (U) Improved Rangefinder. Low-Profile Antenna and SINCGARS Intercom: Begin RDTE for an Improved Rangefinder, survivable low-profile antenna, and SINCGARS Intercom.
 - b. (U) Initiate RDTE program for IFV/CFV new start product improvement: Improved NBC Protection: Requirement is to provide a total Hybrid overpressure system for the CFV, and for both vehicles to use materials that are resistant to NATO decontaminants.

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Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

4. (U) FY 1983 Planned Program: Continue FY82 M1 improvement efforts for an improved Rangefinder that is both eyesafe and able to lase better through obscurants. Also continue integration of an M1 Heading Reference Unit (HRU) to assist the crew when navigating under night or reduced visibility conditions. Continue systems integration of improved M1 Armor to meet advance threat munitions, conduct DT I for the M1 Driver's Thermal Viewer, begin RDTE System integration for M1 Ballistic Overhead Protection, a Survivable Low-Profile Antenna, a Speech Secure Radio System, Signature Suppression, improved hit capability against evasive targets, and an Automatic Muzzle Reference System. The NBC Protective Improvements, an Auxiliary Power Unit, upgraded armor and weight reduction are planned to enter M1 production in 4QFY85 in package #1. IFV/CFV effort will continue development of the FY82 NBC product improvements, and introduce additional phased product improvement efforts as follows:

a. Install and test a heading reference unit to provide a simplified land navigation capability for the IFV/CFV that will operate accurately from within a moving vehicle under reduced visibility conditions. Target date for introduction of this improvement introduction is FY85.

b. Develop, install, and test an improved swim barrier. Install and test a thermal viewer for the driver and an improved fire control system.

5. (U) Program to Completion: Integration of the foregoing M1 product improvements will continue in FY84 with NBC Protective Improvements, an Auxiliary Power Unit (APU), upgraded armor, and weight reduction improvements planned to enter production in 4QFY85 in package #1. Other M1 improvements will enter production in package #2 (FY87) and #3 (TBD). IFV/CFV improvements will continue with evaluation of test results. System integration and introduction of IFV/CFV package #1 (Heading Reference Unit) in FY85. IFV/CFV package #2, including the Improved Swim Barrier, Driver's Thermal Viewer, and Improved Fire Controls, will be introduced in FY86. IFV/CFV improvement package #3 (Improved NBC Protection) is scheduled for introduction in FY87 as is M1 Package #2, which consists of an Improved Commander's Weapon Station with a new independent Commander's and Driver's Thermal Viewer, Heading Reference System, Improved Rangefinder, Low Profile Antenna and SINGARS Intercom.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D330
Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: M1 Tank Improvements
Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The rapid modernization of Soviet armor 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 the superior M1 tank and introduction of subsequent M1 performance improvements for the 1980's and beyond to maintain this superiority. The M1, 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, and mobility, the M1 was designed with growth potential in mind and can be adapted over time by evolutionary improvements to sustain its combat advantage and reduce its logistic burden. The M1 Product Improvement Program (PIP) provides for timely initiation of planned M1 performance improvements beyond the original tank 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 "packages" to minimize production costs while providing effective configuration control. Three packages are currently planned for introduction into production in FY85, FY87, and beyond. The FY85 package (package #1) consists of a Chemical Agent Alarm and Inertial Dust Separator, a Hybrid NBC (over-pressure) system, a companion Auxiliary Power Unit (APU), upgraded Armor and weight reduction. The FY87 package (package #2) concentrates on an Improved Commander's Weapon Station with a new Independent Commander's and Driver's Thermal Viewer, Heading Reference System, Improved Rangefinder, Low-Profile Antenna and SINGGARS Intercom. The TBD package (package #3) contains Signature Suppression improvements, Ballistic Overhead Protection, an Automatic Muzzle Reference System, and improved ability to engage evasive targets. These packages will significantly enhance the M1's survivability, fightability, and overall combat effectiveness on the battlefield. 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 (ILS) problems.

B. (U) RELATED ACTIVITIES: The Tank Automotive Command (TACOM) Tank Base Science and Technology (TBS&T) Program encompasses all tank-related Research (6.1), Exploratory Development (6.2), and Nonsystem Advanced Development (6.3a) efforts for DARCOM. These laboratories provide technologies for handoff to Program Managers. If suitable for the M1, the M1 Program Manager integrates them into the M1 tank. An M1 PIP Steering Committee, chaired by the M1 Program Manager's Office, has been established with TACOM and the Armor Center and School as members. This committee insures thorough coordination of user requirements research efforts, program funding requirements, technology handoff, nonduplicate efforts, and timely PIP implementation. Related Army activities are: Program Element (PE) 6.46.20.A, M1 Tank System; PE 6.46.30.A, Tank Gun

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Project: #D330
Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: M1 Tank Improvements
Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

Cooperative Development; PE 6.26.01.A, Tank and Automotive Technology; PE 6.36.02.A, Advanced Land Mobility Systems Concepts; PE 6.47.25.A, Collective Protective Materiel - Armored Vehicles; PE 6.36.31, Combat Vehicle Turret and Chassis.

C. (U) WORK PERFORMED BY: In-house efforts are accomplished by the Program Manager for M1, Warren, Michigan. The major contractor is Chrysler Defense Engineering, Centerline, Michigan. Other contractor currently involved is Solar International, San Diego, California.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Not Applicable.

2. (U) FY 1981 Program:

a. (U) Nuclear, Biological and Chemical (NBC) Improvements: Initiated contract for development of Inertial Dust Separator, installation of Chemical Agent Alarm, and Improved Materials Resistant to Decontaminating Agents. Initial hardware delivered for subsequent FY82 test.

b. (U) Auxiliary Power Unit: Provides for on-board electrical power source other than the main engine. This enhances the tank's silent watch capability, and reduces fuel consumption by approximately 1000 gallons per year in peacetime. Also aids starting main engine at -65 F. One unit tested on an M1 at Arctic Test Center, five units delivered for FY82 vehicle testing.

c. (U) Ballistic Armor Improvements: Provides for upgraded protection to meet Warsaw Pact weapon and munition improvements. Initiated integration and testing of armor improvements.

d. (U) Weight Reduction*: Offsets weight growth due to current and possible future improvements. Minimum weight reduction goal is .75 tons and will be achieved through changes to the production process and redesign of selected low-risk components.

*NOTE: WTCVA funded.

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Project: #D330
Program Element: #2.37.35.A
DOD Mission Area: #211 - Close Combat

Title: M1 Tank Improvements
Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

3. (U) FY 1982 Planned Program: Initiate M1 systems integration engineering efforts for the following improvements capabilities funded in FY81:

a. (U) Nuclear, Biological and Chemical (NBC) Improvements: Begin testing of inertial dust separator, chemical agent alarm, and improved materials to facilitate decontamination.

b. (U) Auxiliary Power Unit: Conduct development Test/Operational Test (DT/OT) II.

c. (U) Ballistic Armor Improvements: Continue armor improvement for 120mm XM1E1 necessary to maintain parity with Soviet tank advances.

d. (U) Weight Reduction: Continue weight reduction efforts.

e. (U) Commander's Weapon Station and Thermal Viewer: Provides greater visibility which enhances command and control under "dirty battlefield conditions." Initiates contract for delivery of hardware for FY83 testing.

f. (U) Driver's Thermal Viewer: Provides for greater visibility and target acquisition on the "dirty battlefield" and/or during night operations. Conducts installation check test using advanced development prototype provided by the Night Vision and Electro-Optical Laboratory.

g. (U) Heading Reference System: Begins integration of a Heading Reference Unit (HRU) to assist crew in navigation at night or under reduced visibility conditions.

h. (U) Improved Rangefinder, Low Profile Antenna, and SINCGARS Intercom: Begin RDTE for an Improved Rangefinder, survivable Low Profile Antenna, and SINCGARS Intercom.

4. (U) FY 1983 Planned Program: Continue FY82 M1 improvement efforts for an Improved Rangefinder that is both eyesafe and able to operate better through obscurants. Continue Heading Reference Unit (HRU) effort. Continue systems integration of Improved Armor to meet advance threat munitions. An additional \$61.3M (FY83) RDTE funds are required to add armor to package 1. Conduct DT I for the M1 Driver's Thermal Viewer. Begin RDTE for Ballistic Overhead Protection. Continue a Survivable Low Profile Antenna, and a Speech Secure Radio System. Begin Signature Suppression, improved hit capability against evasive targets, and an Automatic Muzzle Reference Sensor.

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111-265 CI, 31 Mar 81

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Project: #0330
 Program Element: #2.37.35.A
 DOD Mission Area: #211 - Close Combat

Title: M1 Tank Improvements
 Title: Combat Vehicle Improvement Program
 Budget Activity: #4 - Tactical Programs

5. (U) Program to Completion: Integration of the foregoing product improvements will continue in FY84 with Nuclear, Biological and Chemical (NBC) Protection Improvements, an Auxiliary Power Unit (APU), upgraded armor, and weight reduction improvements planned to enter production in 4QFY85 in package #1. An additional \$81.7M (FY84) RDTE funds are required to add armor to package #1. Other M1 improvements will enter production in Packages #2 (FY87) and #3 (TBD).

6. (U) Major Milestones:

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
Introduce into Production -		
Package #1	4QFY85	4QFY83
Package #2	4QFY87 (tentative)	4QFY84
Package #3	TBD	2QFY86

Milestone changes are due to realignment of "block" improvement packages as a result of lack of initial Congressional support for M1 improvements other than NBC in FY81.

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	0	16022	25246	15189	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	0	9630	19399	Not Shown	Continuing	Not Applicable

FY81 and FY82 changes are result of FY81 supplemental FY82 amended budget. The M1 Improvement Program was a new-start program in FY81.

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DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/G 4/1
DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT, TEST AND FVA--ETC (11)
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A large grid of 100 squares, arranged in 10 rows and 10 columns. The top-left square contains the number 4, and the top-right square contains the number 7. The grid is used for a math activity where students write numbers in the squares.

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	0	1345	542	0	0	1887
D233	AN/TSQ73 Modifications	0	1345	542	0	0	1887

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 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. Additional memory must be provided if these interfaces are to be supported. The additional memory is also necessary to permit future interface requirements, such as the Air Force's E-3A Sensor Aircraft. The proposed Complementary Metal Oxide Silicon (C-MOS) Memory Expansion will increase the memory from 64 thousand to 96 thousand words with a capability of expanding 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 per system.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: The FY 1982 budget request for the C-MOS Memory Expansion program will permit the completion of design and fabrication of the prototype units. An FY 1981 start for the program was necessary in order to ensure that the necessary capability is available to support the PATRIOT Missile program.

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Program Element: 02.37.39.A
DOD Mission Area: 0213 - Ground Air Defense

Title: AN/TSQ-73 Modifications
Budget Activity: 04 - Tactical Programs

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	-	1345	542	0	1887
Funds (as shown in FY 1981 submission)	-	1445	523	0	1968

Dollar changes are the result of a reduction in the funds available in FY81 for inflation and revised inflation indices in FY82.

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
Missile Procurement						
Funds (current requirements)	-	-	3100	1800		4900
Funds (as shown in FY 1981 submission)	-	-	3455	3061	-	6516
Quantities (current requirements)			9	7		16
Quantities (as shown in FY 1981 submission)					25	25

The quantity and the funds required were reduced due to the scheduled phase-out of selected Hawk and Nike-Hercules units as a result of PATRIOT deployment.

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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 accommodate 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/TSQ-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 Complementary 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 533 circuitboard cards, and will eliminate 16 power supplies and ten core stacks per system.

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 compatibility and 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, Air Defense Command and Control Systems, US Army Missile Command, Redstone Arsenal, AL. Contracted efforts will be sole source.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: None

2. (U) FY 1981 Program: Initiated the Complementary Metal Oxide Silicon (C-MOS) Memory Expansion program to increase the AN/TSQ-73 memory capability from 64 thousand to 96 thousand words. The design and fabrication of two (2) engineering models will be started. Twelve (12) prototype C-MOS Memory Units (CMU) will also be assembled and tested. Software modification, integration, and certification will be started. Maintenance and Diagnostic programs for the new hardware will be written.

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Program Element: #2.37.39.A

DOD Mission Area: #213 - Ground Air Defense

Title: AN/TSQ-73 Modifications

Budget Activity: #4 - Tactical Programs

3. (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. Nine (9) kits are planned for procurement.

4. (U) FY 1983 Planned Program: The remaining seven (7) kits are planned for procurement.

5. (U) Program to Completion: Kit application is scheduled to begin in fourth quarter FY 1984 and to be completed during the third quarter FY 1985.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.40.A

DDO Mission Area: #254 - Tactical Command and Control

Title: Force Level and Maneuver Control System

Budget Activity: #4 - Tactical Program

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion Continuing	Total Estimated Costs Not Applicable
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	0	8000	15259	44515		Not Applicable
D494	Force Level and Maneuver Control System - SIGMA	0	8000	15259	44515	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Force Level and Maneuver Control System, SIGMA, fulfills an urgent need for both command and control of the force (Maneuver Control) from echelons of corps through battalion, and the requirement for integrating the five control systems of fire support, air defense, intelligence/electronic warfare, combat service support, and maneuver control (Force Level). This system is needed to provide the commander the command and control he needs to effectively fight on the modern battlefield and to overcome the numerical superiority of the Warsaw Pact forces by providing accurate, up-to-date information upon which to base estimates and plans, thereby allowing more rapid application of fire and maneuver. SIGMA thus provides the commander the essential elements of information available from the five functional automated control systems as well as satisfying the maneuver control functional requirements. The key feature of this program is its evolutionary development and implementation beginning with immediate (FY 1981) initial Maneuver Control capability in Europe, and expanding in time-phased steps to full Force Level integrating capability in the field by the late 1980's. The current command and control system relies heavily on manual procedures that cannot process in a timely manner all the elements of information required by the commander. SIGMA utilizes existing equipment to meet the immediate need, with provision to evolve to meet the total force level requirement. The Army has the baseline set of requirements which defines what information is required by the battlefield commander and against which SIGMA can be designed. The requirements will continually be validated as a result of feedback from the European deployment. The initial validation will be completed in the third quarter FY 1981, and the baseline requirements, in the form of a Letter of Agreement (LOA), will be approved by the Army in the fourth quarter FY 1981.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Emphasis in FY 1982 is on the evolution of the initial Maneuver Control capability with time-phased increments. Feedback from this introductory effort will be utilized to implement, test, and evaluate new functional Maneuver Control capabilities. A contract to further the implementation of the maneuver control segment of SIGMA will be awarded. Alternative system design concepts for the full SIGMA will be developed and evaluated.

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Program Element: 92.37.40.A

DOD Mission Area: 254 - Tactical Command and Control

Title: Force Level and Maneuver Control System

Budget Activity: 4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Mission Element Need Statement (MENS) Approved	1Q81	4Q80
Contract Award for Maneuver Control	3Q82	2Q81
ASARC/DSARC I	2Q83	Not Shown
Contract Award for Full Sigma	2Q83	Not Shown

The Army approved the MENS and submitted it to the Department of Defense 4 Qtr 80. Approval was obtained 1 Qtr 81. Alternative system design concepts were deferred until FY 1982 per congressional guidance to evolve the ultimate system design based on feedback from the field and to not solicit industry until the system requirements are better defined.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1980	FY 1981	FY 1982	Additional to Completion	Total Estimated Cost
Funds (current requirements)	0	8000	15259	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	0	16274	34708	Continuing	Not Applicable

The FY 1981 Difference is due to reduction by the FY 1981 Authorization Bill.

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Program Element: #2.17.40.A

Title: Force Level and Maneuver Control System

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

The FY 1982 difference is due to realignment of activities based on FY 1981 fund reduction.

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

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Program Element: #2.37.40.A
DOD Mission Area: #254 - Tactical Command and Control

Title: Force Level and Maneuver Control System
Budget Activity: 46 - Tactical Programs

F. (U) **DETAILED BACKGROUND AND DESCRIPTION:** The Force Level and Maneuver Control System (SIGMA) for corps and subordinate echelons will provide combat commanders and their staffs the means to assist them in management coordination and intersystem interface. There are many battlefield automated systems under development as identified in the Army Command Control Master Plan (AC2MP) and the Army Battlefield Interface Concept (ABIC). Each system is generally designed for a specific single functional area and provides data to the combat commander at a rate which 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. Thus an urgent need exists for automated means to assist combat commanders. This project is not reinventing the wheel. It is utilizing existing equipment, the Tactical Computer System (TCS) and the Tactical Computer Terminal (TCT), which are proceeding to type classification under Program Element 6.47.27 A Project D184. An Initial Maneuver Control capability has been established in Europe in the VII Corps, and this initial configuration will undergo a continuing evolutionary development, guided by the concept outlined in the Department of Defense Directive (DODD) 5000.2. There will be a logical, event-oriented, time-phased progression of incrementally developing, testing, evaluating, and fielding of functional capabilities leading to the full Force Level and Maneuver Control System (SIGMA). The advantage of doing this in a live user environment is that it provides the user with an Initial Maneuver Control capability now and permits the user to test alternative configurations to determine the best in light of mission requirements. Under the evolutionary development concept, it is essential to recognize the need for continuous adequate funding. Because of the modular nature of TCS/TCT, augmentation is possible and its nature will be determined from field experience. Contractual effort during FY 1982 will be required to further the implementation of these Maneuver Control functions to full capability and to develop alternative system design concepts for the full SIGMA at the Force Level. These alternative concepts will be based upon the baseline set of requirements and will provide the engineering solution for SIGMA. Contractual efforts in FY 1983 and beyond will be required to implement the Force Level integrating functions under the same evolutionary development process.

G. (U) **RELATED ACTIVITIES:** Program Element 6.47.27.A: Tactical Computer System/Tactical Computer Terminal (TCS/TCT). This project provides the hardware for the maneuver control element and does not duplicate any efforts conducted in SIGMA.

H. (U) **WORK PERFORMED BY:** Project Manager, Operations Tactical Data Systems (OPTADS), US Army Communications Research and Development Command (CORADCOM), Ft Monmouth, NJ. A contractor will be competitively selected for the full SIGMA evolutionary development effort.

I. (U) **PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:** SIGMA is currently pre-milestone zero. A Mission Element Need Statement (MENS) has been approved by Headquarters, Department of the Army, and approval by the Secretary of Defense is expected in the first quarter FY 1981.

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Program Element: #2.17.40.A
000 Mission Area: #254 - Tactical Command and Control

Title: Force Level and Maneuver Control System
Budget Activity: #4 - Tactical Programs

1. (U) FY 1980 and Prior Accomplishments: Not applicable.
2. (U) FY 1981 Program: Modern, militarized computer hardware, specifically the Tactical Computer System (TCS) and Tactical Computer Terminal (TCT), are introduced into Europe VII Corps, as the initial Maneuver Control elements from which evolution will proceed. Relocation of the Software Development and Support Center (SDSC) to Ft Leavenworth, KS, is completed. Procurement documentation for full SIGMA is prepared.
3. (U) FY 1982 Planned Program: Evolution of the Maneuver Control element continues in Europe with time-phased increments to expand the base from which field experience will be obtained. At the same time, feedback from the initial introduction will be utilized at the Software Development and Support Center. Alternative system design concepts for the full SIGMA at the Force Level will be obtained and evaluated to determine the preferred engineering solution.
4. (U) FY 1983 Planned Program: The Maneuver Control portion of SIGMA enters an enhanced phase of evolutionary development by incrementally developing, testing, evaluating and fielding in Europe additional functions. The implementation cycle will be geared to the needs of the user and the capability of Europe to absorb in a logical fashion expanded functional elements of both hardware and software. The full SIGMA program will go to a Milestone I decision at ASARC/DSARC. Following this decision the evolutionary development of full SIGMA commences and links with the maneuver control element.
5. (U) Program to Completion: Total SIGMA evolutionary development continues under contract and in Europe under the incremental fielding approach both in hardware and in software. Evolutionary development software for the full SIGMA, especially Force Level, continues with integration commencing within the Command Control and Subordinate Systems (CCS2) environment.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable *
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	51785	33822	48944	71738		
D104	Joint Tactical Communications (TRI-TAC) Office	5979	6882	7100	7313	Continuing	Not Applicable
D107	Mod to Army TRI-TAC Interface	0	0	5174	5197	Continuing	Not Applicable
D110	Mobile Subscriber Equipment	939	2233	12053	30241	108118	157200
D111	Digital Group Multiplexer	5346	2366	1476	1127	1613	41927
D113	Super High Frequency (SHF) Satellite Modulator - Demodulator (Modem)**	0	0	0	0	0	Not Applicable
D114	Other Service Assigned TRI-TAC Tasks	1421	2532	2036	2247	Continuing	Not Applicable
D116	Facility Support Element	515	860	1072	1007	Continuing	Not Applicable
D117	Short Range Wideband Radio (SRWBR) Assemblages***	800	324	270	278	0	7372
D119	Modular Record Traffic Terminal (MRTT)	2364	8813	8294	12439	55630	89696
D172	Net Radio Interface (NRI)****	626	431	270	141	0	2268
D178	Joint Test Support*****	1300	1573	1741	1899	Continuing	Not Applicable
D222	Automatic Communications Central Office AN/TTC-39	32495	7808	9458	9849	4660	257488

* Quantities include 9-AN/TTC-39 Circuit switches, 7-AN/TYC-39 Message Switches, total of 549 items of DGH family (15 components), 6-AN/GRC-144 Radio Set SRWBR Modification Kits, and 3 each prototype assemblages of AN/TRC-173 Radio Terminal.

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Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)

Budget Activity: #4 - Tactical Programs

AN/TRC-174 Radio Repeater, Standard SRWBR Assemblage, Radio Terminal Set, AN/TRC-175, and the Modified AN/TRC-138 Radio Repeater. Other RDTE quantities represent a number of diverse items.

** This project was transferred to Program Element 3.31.42.A, Satellite Communications Ground Environment, project D456 - Tactical Communications Systems (TACSATCOM) in FY 1980.

*** Project 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 by achieving interoperability between Army and other Department of Defense (DOD) telecommunications systems, providing new equipment which reflects the most recent technology, and eliminating duplication among the service/agency systems. These systems/equipment will provide combat forces with tactical communications equipment to meet the mobility, security, reliability, and availability requirements of the modern battlefield, provide resistance to the intercept and electronic warfare threat of potential enemies, and 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, and a digital, solid-state multichannel transmission system capable only of link security and manual technical control/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 (INTACS) 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.

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Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1982 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 Multiplexers, Short-Range Wideband Radio Assemblies, 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 Directive 5148.9. Continue monitoring other service-assigned TRI-TAC programs to insure Army technical, logistical, training, testing, and user requirements are being satisfied.

Major Milestones*	Current Milestone Dates	Milestone Dates Shown in FY 1981 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	Jun 78/Feb 79	Jul 78/Feb 79
Complete Message Switch/Circuit Switch	Jun 79/May 80	May 79/Apr 80
Defense Systems Acquisition Review Council (DSARC III)		
AN/TYC-39 Message Switch Production Decision	Mar 80	Mar 80

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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	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
AN/TYC-39 Production Award	Sep 80	Apr 80
DSARC 111A - AN/TTC-39 Circuit Switch		
Production Continuation Decision	Jul 80	Sep 80
Production Contract TTC-39/ TYC-39 Switches	Sep 80	Not Shown
Initial Operational Capability (IOC)	Feb 83	Nov 82

1. (U) The DSARC 111 for the AN/TYC-39 was successfully accomplished in Mar 80, and the DSARC 111A for the AN/TTC-39 was accomplished in Jul 80. The production contract for the AN/TTC-39 family of switches was awarded on 30 Sep 80.

2. (U) The FY81 submission data for the start of DTE/IOTE for the circuit switch (Apr 80) was in error--it should have been Nov 79.

3. (U) Validity of total development costs: Costs have been validated in Baseline Cost Estimates (BCE's). Noncontractual program costs are based on historical experience and enjoy a high-confidence level. Overall confidence level for the estimated dollars required is high.

* 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) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
Funds (current requirements)	51785	33822	48944	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	54622	34976	42572	Continuing	Not Applicable

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Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TKI-TAC)

Budget Activity: #4 - Tactical Programs

(U) D104 - The decrease in FY81 was based on application of a general Congressional reduction for inflation. The decrease in FY82 was due to prioritization during the functional review process partially offset by an inflation factor increase.

(U) D107 - This project was not listed in the FY81 CDS's.

(U) D110 - The decrease in FY80 actual was due to delay in award of development contract caused by multinational negotiations. Changes in FY81 and FY82 are due to rescheduling of activities because of the above delay.

(U) D111 - The increase in FY80 was based on approval of an April 1980 request for an additional \$2.5 million to fund additional work on DCM's. Additional work required was redesign of components and improvements in electromagnetic interference and microswitch characteristics. The decrease in FY81 was based on application of a general Congressional reduction for inflation. The change in FY82 was due to an inflation factor increase.

(U) D113 - Program completed.

(U) D114 - The decrease in FY80 was the result of a \$650 thousand reprogramming action to Project Number 222. The decrease in FY81 was due to application of a general Congressional reduction for inflation. The significant decrease in FY82 was based on revision of Program Objective Memorandum (POM) estimate (Air Force Communication Nodal Control Element was slipped to FY83).

(U) D116 - The decrease in FY81 was based on application of a general Congressional reduction for inflation. The change in FY82 was due to an inflation factor increase.

(U) D117 - The decrease in FY81 was based on application of a general Congressional reduction for inflation. The change in FY82 was due to an inflation factor increase.

(U) D119 - The decrease in FY80 was due to delay of award of the MRTT full-scale development contract based on a lengthy period of evaluation of complex contractor proposals. The decrease in FY81 was due to application of a general Congressional reduction for inflation. The change in FY82 was based on increased cost of hardware/software development associated with the AN/TYC-11 communications modules added to the Army program in FY79.

(U) D172 - The decrease in FY81 was based on application of a general Congressional reduction for inflation. The change in FY82 was due to an inflation factor increase.

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Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)

Budget Activity: #4 - Tactical Programs

(U) D178 - The decrease in FY81 was based on application of a general Congressional reduction for inflation. The change in FY82 was based on refinement of estimates.

(U) D222 - Increases in FY80, 81 and 82 were primarily due to including funds to provide for development of Equate capability and for Data Adapters; changes also include inflation factor increases.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army						
Funds (current requirements)	34200	89400	102400	232200	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	39900	87900	178600	-	Continuing	Not Applicable
Quantities (current requirements)	*	*	*	*	*	*
Quantities (as shown in FY 1980 submission)	*	*	*	*	*	*

* Large number of diversified items.

General: The decrease in the FY80 actual resulted from Congressional actions. The increase in the FY81 estimate is based on an increase in the inflation index. The entire TRI-TAC program was restructured for FY82; principal reason for the decrease in the FY82 estimate was shift of procurement of the Communications Nodal Control Elements (CNCE's) to FY81 and beyond.

Project D222: A three-year multiyear contract for TRI-TAC switches was awarded on 30 Sep 80. The FY80 dollars were obligated on that contract. The second year (FY81) cost is \$67,500 thousand, and the third year (FY82) cost is \$75,100 thousand; these costs did not change from the FY81 submission.

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Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
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 commencing in the early 1980's. It will interconnect with the Defense Communications Systems (DCS) and have the capability to interface with systems of our allies (i.e., North Atlantic Treaty Organization). The planned TRI-TAC program will provide a Joint Service tactical switched trunking capability for voice and record communications and for data communications to support the employment of evolving computerized 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 twenty tasks in the TRI-TAC program which have been assigned to the Services; twelve projects have been assigned to the Army.

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 20 January 1978. 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 Family); AMTRON, Milledale, IL (NRI); Singer/Librascope, Glendale, CA (SST); and IIT 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.

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Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications Program (TRI-TAC)
Budget Activity: #4 - Tactical Programs

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 (HSCS)).

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Two competitive advanced development contracts were awarded for the AN/TTC-39 family of circuit and message switches in 1972. The two AN/TTC-39 switch contractors submitted prototype model design plans and completed development and testing of prototype models in December 1973. The Defense Systems Acquisition Review Council (DSARC) approved entry into full-scale engineering development on 12 April 1974, and an engineering development contract was awarded to GTE-Sylvania on 16 April 1974. Performance specifications were developed for a family of Digital Group Multiplexers, and after evaluation of competitive bids, a full-scale engineering development contract was awarded to Raytheon Company in May 1975. A study contract was awarded to Communications Satellite Corporation in April 1975 to develop concepts and optimum methods for Army employment of a Super High Frequency (SHF) Demand Assigned Multiple Access (DAMA) Satellite Modulator/Demodulator (Modem). The AN/TTC-39 Automatic Communications Central Office Integrated Test Plan, Final Design Reviews on the Digital Group Multiplexer (DGM) family, and the SHF Satellite Modem study were completed in 1976. A Special DSARC Review was held in November 1976 on the AN/TTC-39 family of switches as a result of a breach of Development Concept Paper #135 cost and schedule thresholds. As a result, a revised program baseline was established, which extended the circuit switch schedule by 16 months and the message switch schedule by 9 months. The AN/TTC-39 contractor was directed to constrain development effort through FY 1977 under a cumulative funding cap of \$100.5 million. Research and Development Acceptance Test (RDAT) began on the AN/TTC-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. Preparation continued for award of a Net Radio Interface (NRI) engineering development contract award in FY78. During FY 1978 Research and Development Acceptance Test (RDAT) on the AN/TTC-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/TTC-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 began 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 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

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Inventory equipment necessary to support the testing of all TRI-TAC equipment as required by DOD Instruction 5148.8, 13 June 1980, was completed. Preparations continued for award of a Modular Record Traffic Terminal (MRTT) PSD contract in FY79. Engineering development contract for Short-Range Wideband Radio (SRWBR) modification to the AN/GRC-144 Radio Set was awarded. 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. During FY80, contractor performance of ongoing development programs was supported and monitored. The following actions were also taken: awarded a three-year multiyear contract for AN/TTC-39 and AN/TYC-39 switches on 30 Sep 80 following favorable DSARC III and IIIA decisions; awarded a Full-scale Development (FSD) contract for the Single Subscriber Terminal (SST) on 29 Sep 80; prepared for MSE DSARC I milestone; continued monitoring other Service managed TRI-TAC programs; continued operation and maintenance of the Facility Support Element; continued support of the TRI-TAC Office and Joint test Element; continued monitoring of other service assigned TRI-TAC projects; completed Development test and Evaluation of the DGM equipment and the AN/TRC-173 and AN/TRC-174 assemblages; began evaluation of contractor proposals for the Modular Tactical Communications Center (MTCC).

2. (U) FY 1981 Program: Continue engineering and fabrication efforts on Single Subscriber Terminal (SST) and continue to monitor and evaluate the contractor performance. Initiate planning for DTE/IOTE of (SST). Continue evaluation of proposals on the Modular tactical Communication center (MTCC) and award Mobile Subscriber Equipment (MSE) contract. Conduct Mobile Subscriber Equipment (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. Prepare for a award initial production contract for SRWBR Product Improvement Kits. Continue monitoring of other service-managed TRI-TAC items. Continue operation and maintenance of Facility Support Test Element. Complete IOTE for DGM equipment and AN/TRC-173 and AN/TRC-174. Prepare for and award an initial production award for DGM equipment and AN/TRC-173, AN/TRC-174, and AN/TRC-175 assemblages following a favorable DA In-Process Review.

3. (U) FY 1982 Planned Program: Award engineering development contract for Mobile Subscriber Equipment (MSE) Modules. Continue design and fabrication of Modular Tactical Communications Center (MTCC). Monitor contractor progress and evaluate performance. Initiate DTE/IOTE of Single-Subscriber Terminal. Continue monitoring 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. Continue software interface development for TTC/TYC-39 and emerging TRI-TAC systems, and provide necessary TRI-TAC Interfaces.

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Program Element: #2.80.10.A

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4. (U) FY 1983 Planned Program: Complete DTE/IOTE of SST; conduct In-Process Review and award initial production contract. Continue development of MTCC; initiate preparation for DTE/IOTE. Continue software interface development for maintaining interoperational system compatibility of software between fielded communications systems and emerging TRI-TAC systems. Continue monitoring other service-managed TRI-TAC items. Continue funding support of TRI-TAC Office and Joint Test Element.

5. (U) Program to Completion: Complete DTE/IOTE of MTCC, conduct ASARC/DSARC, and award initial production contract. Continue all ongoing efforts in TRI-TAC software system compatibility and other service-managed TRI-TAC items.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D104

Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office

Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

A. (U) **DETAILED BACKGROUND AND DESCRIPTION:** The Joint Tactical Communication (TRI-TAC) Office was established by the Secretary of Defense to provide overall joint management of the TRI-TAC Program. Department of Defense (DOD) Directive 5148.7 placed the Director, TRI-TAC Office, under the staff supervision of the ASD(C3I), and Project D104 was created to provide funding support to the TRI-TAC Office. The major thrusts of the TRI-TAC Program are to provide equipment and systems that are common/interoperable between services, that permit 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 through outstanding technological advances and improved supportability. Each Service/Agency is tasked by the Secretary of Defense to acquire elements of the TRI-TAC program. The tasked Service/Agency funds the R&D effort for the tasked elements and procures those elements to satisfy all DOD requirements. Each Service/Agency must also budget for a pro rata share of the TRI-TAC Joint Test Element costs. TRI-TAC Office funding levels are recommended by the Director, approved by the ASD(C3I), and programmed by the Army. 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 for NATO and other allied governments. He prepares equipment specifications, configuration control, maintains integrity of systems design, prescribes the technical and performance standards for TRI-TAC systems and equipment 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. The Director also 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:** The Army-related projects in Program Element 2.80.10.A are: D107-Mod to Army TRI-TAC Interface, D110 - Mobile Subscriber Equipment, D111 - Digital Group Multiplexer Family, D114 - Other Services Assigned TRI-TAC Tasks, D222 - Automated 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). Other Services/NSA efforts are as follows:

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Project: #D104

Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office

Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

<u>Air Force (PE 2.80.10.F)</u>	<u>Navy (PE 2.80.10.N)</u>	<u>NSA (PE 3.34.01.G - Comm Security Equipment)</u>
Technical Communications Control Facilities (TCCF)	Tactical Digital Facsimile (TDF) AN/UXC-4	PENLEY 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.H)	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 1980 and Prior Accomplishments: The TRI-TAC office was officially established on 1 July 1971. First efforts included development of a Joint Service specification for the TRI-TAC family of switches (AN/TTC-39), including specifications for related communications security equipment, and preparation and distribution to program participants of a series of long-range plans. In 1974 full-scale development (FSD) contracts for the switches and related communications security were awarded by the Army and NSA, respectively. In 1975 development contracts were awarded for the TRI-TAC Technical Control Facility (Air Force) and the Digital Group Multiplexer family (Army). In 1976, FSD contracts were awarded for the Digital Tropospheric Scatter Radio Terminals (AN/TRC-170) (Air Force), and advanced development contracts were awarded for the Digital Nonsecure Voice Terminal (DNVT). The Joint Test Facility was established in 1976, and DOD promulgated specific guidance on Service/Agency responsibility for Joint Test and Evaluation. In 1976 the TRI-TAC office was designated the Executive Agent for development of the Advanced Narrowband Digital Voice Terminals (ANDVT) for securing narrowband radio and

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Project: #D104
Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

telephone circuits. TRI-TAC office efforts in 1977 included revision of the TRI-TAC Program/Budget Guide and formulation of both a TRI-TAC Test and Evaluation Plan and a Program Management Plan. Numerous performance and interface specifications were prepared and issued, and the TRI-TAC office participated in the source evaluation and selection for FSD contracts for the Tactical Digital Facsimile and the Unit Level Circuit Switch. TRI-TAC office efforts in 1978-1979 centered around evaluating contractor performance on all ongoing FSD contracts and monitoring validation of the Communication System Central Element. The office also participated in the selection process for contracts for the Digital Net Radio Interface, Digital Nonsecure Voice Terminal, and the Short-Range Wideband Radio Modifications to the AN/GRC-144 Radio Set. The Office provided overall management and coordination for the completion of the Joint Test Facility and 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, Digital Group Multiplexer family, and TENLY/SEELEY Communications Security programs. In 1980, the TRI-TAC office monitored DTE/IOTE on the above systems. Successful defense Systems Acquisition Review Councils were held in 1980 for the TRI-TAC switches, and a production contract (three-year multiyear) for AN/TYC-39/AN/TTC-39 switches was awarded by the Army. Competitive FSD contracts for the development of the Digital Nonsecure Voice Terminal were awarded by the Air Force.

2. (U) FY 1981 Program: Monitor completion of DTE/IOTE on the Communications Nodal Control Element, the Tactical Digital Facsimile, and associated communications security equipment. Insure award of initial production contract for Digital Group Multiplexer and Digital Tropospheric Scatter Terminals.

3. (U) FY 1982 Planned Program: Monitor completion of DTE/IOTE of the Digital Nonsecure Voice Terminal and insure award of initial production contracts for the Communications Nodal Control Element, Tactical Digital Facsimile, and the Digital Nonsecure Voice Terminal.

4. (U) FY 1983 Planned Program: Monitor deliveries/fielding of TRI-TAC switches to operational units. Monitor completion of DTE/IOTE on Unit Level Circuit Switches.

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

6. (U) Major Milestones: Not Applicable.

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Project: #D104
 Program Element: #2.80.10.A
 DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office
 Title: Joint Tactical Communications (TRI-TAC) Program
 Budget Activity: #4 - Tactical Programs

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
RDTE						
Funds (current requirements)	5979	6332	7100	7313	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	5979	7034	7648	-	Continuing	Not Applicable
Quantities (current requirements)						*
Quantities (as shown in FY 1981 submission)						*

*No hardware or software quantities are included in this project.

Other Appropriations: Not Applicable.

Funding Differences: The decrease in the FY 1981 funding estimates is based on application of a general Congressional reduction for inflation. The decrease in FY82 funding estimates is due to prioritization during the functional review partially offset by an inflation factor increase.

Validity of the Development Costs: Validity is excellent because required funds are for predictable civilian salaries, operating expenses, and support contracts.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D107

Program Element: #2.80.10.A

DOD Mission Area: #256-Tactical Communications

Title: Mod to Army TRI-TAC Interface

Title: Joint Tactical Communication (TRI-TAC) Program

Budget Activity: #4-Tactical Program

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Project represents a new requirement for hardware and software modifications to the AN/TTC-39 Message Switch and the AN/TTC-39 Circuit Switch. This capability is necessary to insure interoperability and interface with emerging NATO and US systems and equipment that are scheduled for fielding subsequent to the AN/TTC-39 family of switches. Without this capability, the resulting noninteroperability of emerging TRI-TAC subsystems would adversely impact mission completion capability and combat readiness.

B. (U) RELATED ACTIVITIES: Software growth is directly related to Program Element 2.80.10.A, project D222, Automatic Communications Central Office AN/TTC-39 family of switches.

C. (U) WORK PERFORMED BY: Project Manager, Multi-Service Communications Systems, US Army Communications Research and Development Command, and the TRI-TAC Office located at Fort Monmouth, NJ.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Not Applicable. New program beginning in FY 1982.
2. (U) FY 1981 Program: Not Applicable. New program beginning in FY 1982.
3. (U) FY 1982 Planned Program: Begin developing software to provide an alternate parent switch interface between the AN/TTC 39 family of switches and the AN/TTC-42 Unit Level Circuit Switch. Begin software development to provide an interface capability between the AN/TTC-39 family of switches and the Communications Nodal Control Element (CNCE), the Communications System Control Element (CSCE), and the Advanced Narrowband Digital Voice Terminal (ANDVT). In addition, start software design of an emergency recovery capability for the AN/TTC-39 family of switches.
4. (U) FY 1983 Planned Program: Continue interface development started in FY 1982. Start planning for testing and insertion of the interfaces being developed.
5. (U) Program to Completion: Complete the interfaces. Initiate new software efforts to develop interface with the EUROCOM (digital) system and the ELCROVOX (secure voice) equipment. Do hardware and software development to incorporate the requirements of Interface Control Document (ICD) - 004. Perform equipment and system-level testing of all new software prior to implementation.

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Project: #D107

Program Element: #2.80.10.A

DOD Mission Area: #256-Tactical Communications

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Title: Mod to Army TRI-TAC Interface

Title: Joint Tactical Communication (TRI-TAC) Program

Budget Activity: #4-Tactical Program

6. (U) Major Milestones: Not Applicable.

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
RDTE						
Funds (current requirements)	-	-	5174	5197	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	Not Shown					

Other Appropriations: Not Applicable.

Validation of Development Cost Estimates: Costs are Army Engineering estimates based on experience; they are not supported by formal cost estimates and must be considered best estimates available at this time.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D110

Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Mobile Subscriber Equipment (MSE)

Title: Joint Tactical Communications Program

Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to provide highly responsive, secure communications to key command and control personnel in a highly mobile battlefield environment. MSE will free the commander from the delays inherent in installing multichannel communications after tactical movement, and will significantly improve his capability to effectively command his forces under virtually all tactical situations. The system will be capable of deployment at various echelons by land-based forces of all US military services to satisfy the direct communications requirements of mobile users who must communicate with each other and with static subscribers via the tactical switched communications. Specifically, the MSE will meet the requirements for the transmission of both voice and data information within the division area. Major characteristics of the MSE system are: (1) highly mobile to provide continuous communications during the dynamics of combat; (2) direct user-to-user dial-up capability; (3) automatic routing of information; (4) secure and jam-resistant information transfer; (5) interface with static switched communications equipment and net radio. The Army approved the Integrated Tactical Communications System (INTACS) for implementation on 19 February 1976. Mobile Subscriber Equipment (MSE), a subsystem of INTACS, was designated a major system on 12 December 1977. The MSE element is also an integral part of the TRI-TAC system architecture. A mission element need statement (MENS) for MSE was approved by the Deputy Secretary of Defense on 8 January 1980.

B. (U) RELATED ACTIVITIES: All services and the National Security Agency are participating in the development of MSE through their respective TRI-TAC programs. Development efforts in the Army related to the MSE program are conducted in Program Element 2.80.10.A under Project D111 - Digital Group multiplexer family, D114 - Other Service Assigned TRI-TAC programs, D116 - Facility Support Element, D117 Short-Range Wideband Radio Assemblages, D119 - Modular Record Traffic Terminal (MRTT), 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 Mobile Subscriber Equipment (MSE) developments. They represent other elements of the Army's Integrated Tactical Communications System (INTACS) that, with MSE, insure a viable and integrated program. Centralized management by Office of the Secretary of Defense (OSD) through 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: Director, HQDA, Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS) Special Task Force for Mobile Subscriber Equipment (STF-MSE), Fort Monmouth, New Jersey.

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Project: #D110
Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Mobile Subscriber Equipment (MSE)
Title: Joint Tactical Communications Program
Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 & Prior Accomplishments: Completed OSD Program Review. Obtained Mission Area Analysis (MAA), Joint Chiefs of Staff (JCS) approved (JOR), Joint Operational Requirement (DIA) Defense Intelligence Agency validated MSE threat and OSD approved MENS. In accordance with January 1980 US/German Agreement in Principle, conducted exploratory negotiations to determine feasibility of cooperative development program. At the request of the Netherlands, conducted trilateral discussions for purpose of program information exchange and presentation of a US proposal for cooperative development. Obtained approval of organization staffing plan for MSE project management office. Draft system specifications and procurement documentation have been prepared and are in review cycle.
2. (U) FY 1981 Program: Transition from Special Task Force to Project Management Office. Prepare for US development of MSE consistent with current budget profile; maintain cooperative development options. Prepare and issue a Request for Proposal (RFP) to US industry for MSE development. Establish source selection evaluation process. Initiate planning for test and evaluation program.
3. (U) FY 1982 Planned Program: Perform RFP bid evaluation, negotiation, and award contract for MSE development. Prepare for appropriate DA and OSD reviews. Coordinate with NSA for the parallel development of MSE Communications Security Equipment (COMSEC). Continue test and evaluation planning.
4. (U) FY 1983 Planned Program: Monitor and evaluate MSE contract, participate in contractor design reviews. Monitor NSA activities concerning development of MSE COMSEC requirement/equipment. Continue planning for test and evaluation.
5. (U) Program to Completion: Complete development contract, conduct Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE), conduct ASARC production decision presentations, submit for type classification action, prepare for production contract, evaluate proposal for production contract and award production contract, plan for and institute operator and maintenance training and initial fielding.

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Project: #D110 Title: Mobile Subscriber Equipment (MSE)
 Program Element: #2.80.10.A Title: Joint Tactical Communications Program
 DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

6. (U) Major Milestones

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
STF Established	Feb 78	Not applicable
ASARC I	Sep 79	No milestones
OSD Program Review	Nov 79	Submitted in FY 1981
NENS approved	Jan 80	
Issue RFP	Jul 81	
Award Development Contract(s)	Aug 82	
DTE I/OTE II Start	Sep 86	
ASARC III	Nov 87	
Award Production Contract	Jan 88	
First Unit Delivery	Jan 90	

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirement)	939	2233	12053	30241	108118	157200
Funds (as shown in FY 1981 submission)	4539	2212	13120	-	128660	157200

Decrease in FY 1980 due to delays in award of development contract caused by multinational negotiations.
 Increase in FY 1981 and decrease in FY 1982 are due to rescheduling of activities because of the above delay.

Other Appropriations: Not Applicable.

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Project: #D110
Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Mobile Subscriber Equipment (MSE)
Title: Joint Tactical Communications Program
Budget Activity: #4 - Tactical Programs

E. (U) TEST AND EVALUATION DATA

1. (U) Development Test and Evaluation: A combined Development Test and Evaluation and Initial Operational Test and Evaluation (DTE/IOTE) is scheduled during FY86 for the Single Channel Radio Access/Mobile Subscriber Equipment (SCRA/MSE). Engineering development models will be tested at DTE/IOTE; they are expected to be essentially identical to production models. Specific test and evaluation arrangements will be negotiated with the codevelopment nation(s) prior to award of an engineering development contract.

2. (U) Operational Test and Evaluation: See above.

3. (U) System Characteristics: The critical hardware characteristics and performance requirements to be tested will be stated in a single common specification which satisfies the needs of all the development nations. These requirements and characteristics are presently being reviewed among the nations in order to merge their individual requirements into a common test document.

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FY 1982 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) consists of secure tactical record traffic terminal equipment and assemblages which will significantly improve the speed and accuracy of tactical record communications while reducing the manpower dedicated to traffic-handling functions. The MRTT provides facilities to compose, edit, process, transmit, receive, distribute, and switch record traffic without the generation of intermediate documents. This system will replace the obsolete, unreliable, manpower-intensive, low-speed record traffic equipment (primarily teletypewriters) presently used for tactical record communications at all echelons of command. Two levels of user employment are planned: Single Subscriber Terminals (SST) and Modular Tactical Communications Centers (MTCC). The SST consists of individual devices configured as terminals to meet individual user requirements. The MTCC consists of an assemblage of SST's, an optical character reader, line printer, tactical digital facsimile, AN/TTC-11, Message Switch, and other peripheral equipment into a processor-controlled truck-mounted, tactical message center. This equipment, operating within the TRI-TAC environment, will eliminate the time-consuming paper tape relay communications now used tactically, and will greatly reduce the time elapsed from release of a message until it is in the addressee's hands. This will occur through the elimination of multiple message preparation in varying formats (e.g., written, typewritten, punched paper tape, teletypewriter printer page), more efficient message routing and distribution under computer control, and transmission speeds as much as 16-32 times faster than is available with the electromechanical equipment now in use. This program uses proven, available commercial and military equipment and technology, and represents a low-to-moderate technological risk for development.

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 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, Multi-Service Communications Systems (MSCS), US Army Communications Research

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Project: #D119

Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Modular Record Traffic Terminal (MRTT)

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Budget Activity: #4 - Tactical Programs

and Development Command, and the TRI-TAC office, both located at Fort Monmouth, NJ. Single Subscriber Terminal (SST) development contractor is Singer/Librascope, Glendale, CA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: The Office of the Secretary of Defense (OSD) formally assigned the MRTT task to the Army on 10 May 1977. The AN/TYC-11 Message Switch, which is now a component of the MTCC, was transferred to the Army from the Marine Corps on 26 March 1979. As the AN/TYC-11 transfer occurred subsequent to validation and approval of the Determination and Findings (D&E) for the MRTT, cost and schedule documents were updated to reflect the impact of the AN/TYC-11 addition. This update was completed in January 1980, based upon existing requirements, and has resulted in a thorough review of program requirements, costs, and affordability which is still underway. SST Full-Scale Development (FSD) contract was awarded 29 September 1980. Program management was transferred to PM, MSCS in June 1980 from PM, Army Tactical Communications Systems. During FY 1980 the MTCC FSD Request for Proposal (RFP) was released to industry. Evaluation of contractor proposals in response to the RFP was begun.

2. (U) FY 1981 Planned Program: Continue development of the SST and initiate planning for Developmental/Operational Testing II (DT II/OT II). Complete source selection and award FSD contract for Modular Tactical Communications Center (MTCC). Release RFP for Optical Character Reader (OCR), conduct source selection, and award FSD contract.

3. (U) FY 1982 Planned Program: Continue to monitor contractor progress and evaluate performance on three MRTT contractors. Begin DTE/IOTE on the SST. Prepare for Development Acceptance In-Process (DEVA-IPR) and type classification. Prepare for a production contract for the SST. Begin preparation for OTE/IOTE on the Optical Character Reader (OCR).

4. (U) FY 1983 Planned Program: Complete DTE/IOTE of SST, conduct DEVA-IPR, type classify and award initial production contract. Begin DTE/IOTE on the OCR and begin preparations for DEVA-IPR, type classification and initial production contract of the OCR. Continue to monitor contractor progress and evaluate performance on the MTCC. Begin preparations for DTE/IOTE on MTCC.

5. (U) Program to Completion: Complete DTE/IOTE on OCR, conduct DEVA-IPR, type classification and award initial production contract for optical character readers. Conduct and complete DTE/IOTE on MTCC, prepare and complete ASARC/DSARC reviews on MTCC, type classify, prepare for and award initial production contract. Transition all items to CERCOM.

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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

6. (U) Major Milestones:

Major Milestones	Current	Milestone Dates Shown in FY 1981 Submission*
	Milestone Dates SST / OCR / MTCC	
FSED Contract Award	Sep 80/Sep 81/Sep 81	May 80/Sep 80
Development Test and Initial Operational Test and Evaluation Start	Sep 82/Sep 83/TBD	Nov 81/Jan 84
Development Test and Initial Operational Test and Evaluation Completion	Mar 83/Feb 84/TBD	Apr 82/Oct 84
Decision to Proceed with Production	May 83/Apr 85/TBD	Jun 82/Dec 84
Initial Production Contract Award	Jun 83/May 85/TBD	Aug 82/Feb 85
Initial Production Deliveries Start	Jul 85/Jun 85/TBD	Jan 84/Feb 87
Initial Operational Capability Date	Apr 86/NA/TBD	Aug 84/Sep 87

SST/OCR milestone dates have been adjusted from the FY 1981 submission to reflect current best estimates of attainable dates consonant with funding. MTCC milestones are currently under review in light of near-term funding shortfalls.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	2364	8813	8294	12479	10868	69100
Funds (as shown in FY 1981						

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Project: #D119 Title: Modular Record Traffic Terminal (MRTT)
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	FY 1980 <u>Actual</u>	FY 1981 <u>Estimate</u>	FY 1982 <u>Estimate</u>	FY 1983 <u>Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
submission)	9000	9465	6271	-	11563	42937
Quantities (current requirements)*						
Quantities (as shown in FY 1981 submission)						

* 40 SST's
 8 MTCC's with AN/TYC-11's

Decrease in FY 1980 From 1981 submission due to increased complexity of Modular Tactical Communications Center development bids over expectations, which precluded completion of evaluation during FY 1980, and thus precluded contract award as had been planned earlier. Increases in subsequent years are due primarily to the increased costs of hardware/software development associated with the AN/TYC-11 added to the Army program in 2Q FY 1979. FY 1981 decrease due to the application of general Congressional reductions. Estimated costs are based upon a baseline cost estimate which will be updated prior to the FY 1983 submission.

Other Appropriations: Not Applicable.

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FY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #0222

Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39

Title: Joint Tactical Communications (TRI-TAC) Program

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 and message switches (AN/TTC-39) equipped for 50 lines. Circuit switches (600-line) 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 multi-service 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 current inventory analog switching systems (manual and interim automatic) to an automatic 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. The AN/TTC-39 family is the heart and lead development item of the Joint Tactical Communications (TRI-TAC) Program (a joint Service and Defense Agency program to develop and field a family of secure, digital, mobile/transportable trunking, access, and switching equipment to satisfy the Services' tactical multichannel switched communications systems requirements in the early 1980's). It will be interoperable with the Defense Communications System (DCS) and interface with systems of our allies. Overall management is provided by the Office of the Secretary of Defense (OSD) thru the Director, TRI-TAC Office. Each Service/Defense Agency is tasked by OSD to develop various elements of the TRI-TAC system architecture. The tasked Service/Agency totally funds the R&D phase and acts as the procuring Service for all DOD quantities in the production phase. Test and Evaluation is managed by the Director, TRI-TAC Office, thru a Joint Test Element that is funded by each Service/Agency on a pro rata basis. The AN/TTC-39 family development was assigned to the Army by OSD in January 1972. The Advanced Development phase was completed in March 1974.

B. (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 -

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Project: #D222
Program Element: #2.80.10.A
DOD Mission Area: #256 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

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 management for all Service efforts and is funded by the Army under D104 per DOD Directive 5148.7. The Army's share (35%) of the TRI-TAC Joint Test Element is funded in project D178 (Joint Test Support) per DOD Instruction 5148.8. Project D116 - Facility Support Element funds the Army support to the TRI-TAC Joint Test Program with a baseline of current inventory equipment per DOD Instruction 5148.8. D107, a new project, provides for software and hardware changes required for interfaces between TRI-TAC and other equipment. 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 1980 and Prior Accomplishments: Hardware development was initiated in FY 1972 when a Joint Service Specification was developed, and two competitive prototype contracts for Advanced Development (Phase I) were awarded. Advanced Development of the AN/TTC-39 continued in 1973. 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, 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. In FY74, a Defense Systems Acquisition Review Council (DSARC) II was held, Full-Scale Development (PSD) was approved by the Deputy Secretary of Defense, and a Cost Plus Incentive Fee (CPIF) contract was awarded to GTE-Sylvania. In FY75, 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. The resultant Engineering Change Proposals caused a two-month slippage in milestones starting with the Final Design Review. During FY 1976, the contractor fell behind schedule because of problems in the completion of specifications and development of circuit switch software, and 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

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1976 Government conclusion that cost growth was occurring and submitted an estimate of \$105.2M as the cost at completion. 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. In FY77, a Special Defense Systems Acquisition Review Council (DSARC) approved program continuation on a revised cost and schedule baseline (16-month circuit switch extension). In FY78, 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) for final review and approval. OSD approved this revision. Major milestones attained were the completion of Contractor Development test and the ahead-of-schedule start of Government development test of the AN/TTC-39 message switch. In addition, a training configuration of the AN/TTC-39 was delivered to the US Army Signal School where the first Government-conducted training of military personnel began in August 1978. During FY79 Government Development Test and Evaluation (DTE) and Operational Test and Evaluation (OTE) on the AN/TTC-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. During FY 1980 DTE/OTE of the AN/TTC-39 Circuit Switches was completed. A DSARC III for the AN/TTC-39 was held in March 1980, and a DSARC IIIA for the AN/TTC-39 was held in July 1980. A production contract (3-year multiyear) was awarded in September 1980. Contractor development of software for interface with other TRI-TAC developments and support of the AN/TTC-39 and AN/TTC-39 models currently at the TRI-TAC Joint Test Facility were continued.

2. (U) FY 1981 Program: Continue contractor development of software for interface with other TRI-TAC developments and support of AN/TTC-39 and AN/TTC-39 models retained in the TRI-TAC Joint Test Facility used to support joint test of other TRI-TAC developments.

3. (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/TTC-39 models retained at the TRI-TAC Joint Test Facility to support joint test of other TRI-TAC developments.

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Project: #D222

Program Element: #2.80.19.A

DOD Mission Area: #256 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39

Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

4. (U) PY 1983 Planned Program: Continue contractor development of software for interface with other TRI-TAC developments. Continuation of contractor support of AN/TTC-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:

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Suballston</u>
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	Jun 78/Feb 79	Jul 78/Feb 79
Complete Message Switch/Circuit Switch	Jun 79/May 80	May 79/Apr 80
Defense Systems Acquisition Review Council (DSARC) III AN/TYC-39 Message Switch	Mar 90	Mar 90
Production Decision		
AN/TYC-39 Production Award	Sep 80	Apr 80
DSARC IIIA AN/TTC-39 Production Continuation	Jul 90	Sep 80
Decision		
Initial Operational Capability (IOC)	Feb 83	Nov 82

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

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	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	32495	7808	9458	9849	4660	257488
Funds (as shown in FY 1981 submission)	26946	7735	6861	-	6105	240865
Quantities (current requirements)	16	0	0	0	0	16*
Quantities (as shown in FY 1981 submission)	16	0	0	0	0	16

Other Appropriations:

Other Procurement, Army:						
Funds (current requirements)	34200	67500	76500	34900	299100	512200
Funds (as shown in FY 1981 submission)	39900	66900	67500	-	272000	446300
Quantities (current requirements)	8	20	25	10	75	138**
Quantities (as shown in FY 1981 submission)	16	22	21	-	79	138

* Engineering Development models include 7 AN/TTC-39 and 9 AN/TTC-39 switches

**Total Army quantity of 138 represents 105 AN/TTC-39 (300 line), 10 AN/TTC-39 (600 line) and 23 AN/TTC-39 message switches

Increases in FY80, 81, and 82 RDTE were due to including funds to provide for development of Equate capability for Data Adapters (in FY80). Increases also include application of revised inflation indices.

The confidence in total estimated RDTE costs is high due to the maturity of the development program. Confidence in procurement costs is excellent, with FY80-82 costs based on a three-year-multiyear contract.

The changes in Other Procurement Army Appropriations resulted from a \$5.9M Congressional cut in FY80, an increase in the FY82 program of \$5.9M to fully fund the program, and application of revised inflation indices.

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E. (U) TEST AND EVALUATION DATA

1. (U) Development Test and Evaluation: The AN/TTC-39 Circuit Switch (CS) completed Development Test (DT) II on 2 Nov 79. Specific objectives were: (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. Testing of enhanced software for the AN/TTC-39 Message Switch (MS) began in Aug 80 and is intended to be a continuous project as new interface requirements are required by future developments. Electromagnetic pulse (EMP) testing of the Message Switch was conducted during the period 11 Aug-11 Sep 80.

(U) During the 9 months of DT, the AN/TTC-39 Circuit Switch demonstrated analog and digital switching capabilities far greater than that of any other switching equipment now in the US military inventory. Only minor deficiencies were identified in the final DT II Report for the AN/TTC-39, dated Jan 80. Of the nine (9) deficiencies, software anomalies accounted for six (6), and they are being corrected in the new software currently being tested.

(U) All hardware deficiencies have been corrected or are being corrected by design changes prior to production model initiation. Due to hardware commonality between message and circuit switches, the EMP testing indicates that the Circuit Switch can survive all expected levels of EMP.

(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) and a digital message switch (50-line). The 600-line circuit switches 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 that was tested is 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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 Program Element: #2.80.10.A
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Title: Automatic Communications Central Office, AN/ETC-39
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(U) GTE Sylvania, Needham, MA, was the development contractor and the test support contractor. The Army Program Manager is Program Manager, Multiservice Communication Systems (PM MSCS), Fort Monmouth, NJ. DT was conducted by the Digital Communications Test Company, US Army Electronic Proving Grounds (USAEPC), US Army Test and Evaluation Command (USATECOM). The US Air Force (USAF), US Navy (USN), US Marine Corps (USMC), and National Security Agency (NSA) also participated in the conduct and evaluation of the tests.

(U) The Joint Test Facility, Fort Huachuca, AZ, as well as the remote operating areas around Fort Huachuca, AZ, provided the primary facilities for conducting DT II of the AN/TTC-39 and AN/TYC-39 program. However, interoperability tests were also conducted with the Naval Telecommunications System Test Node (NTSTN) located at San Diego, CA. DT II for the AN/TYC-39 and AN/TTC-39 was conducted by the US Army Test and Evaluation Command (TECOM) with support of the Joint Test Organization at Fort Huachuca, AZ. Testing was conducted by military personnel from appropriate communications units. Contractor support continued during testing. EMP testing was conducted by personnel from US Army Electronic Research and Development Command (USAERADCOM) Harry Diamond Laboratories at the HDL Woodbridge, VA, research facility.

(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 Estimates
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

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Budget Activity: #4 - Tactical Program

	Approved Program	Completed/Current Estimates

Research Development and Acceptance Test:

o Begin Message/Circuit Switch	May 77/Mar 78	May 77/Mar 78
o Complete Message/Circuit Switch	Apr 78/Nov 78	Jun 78/Mar 79

DT II/OT II:

o Start Message/Circuit Switch	Jul 78/Feb 79	Jun 77/Feb 79
o Complete Message/Circuit Switch	May 79/Nov 79	Jun 79/Nov 79
o AN/TTC-39	Oct 79	Apr 80
o AN/TTC-39	Oct 79	Jul 80
o Initial Production Award	Nov 79	Sep 80
o USAF C3 Operational Exercise	Feb 82	Feb 82

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Budget Activity: #4 - Tactical Program

	Approved Program	Completed/Current Estimates
PATE:		
o Start Message/Circuit Switch	May 82/Oct 82	Jul 92/Dec 82
o Complete Message/Circuit Switch	Sep 82/Feb 83	Nov 82/May 83

FOTE:

o Start Message/Circuit Switch	Oct 82/Jan 83	Nov 82/Feb 83
o Complete Message/Circuit Switch	Dec 82/Mar 83	Mar 93/Jun 83

(U) During DT II, three (3) 50-line AN/TTC-39 message switches were under test. There were two (2) 300-line and two 600-line AN/TTC-39 circuit switches undergoing DT II. During Follow-on Test and Evaluation (FOTE), two (2) 50-line AN/TTC-39 message switches and two (2) 300-line AN/TTC-39 circuit switches will undergo testing.

(U) Software is being retested and will continue to be tested as improvements/changes are introduced. The contractor, at the GTE Sylvania plant, and Government testers at the Joint Test Facility (JTF) will insure that the test environments for future tests are similar to previous tests.

(U) Reliability, availability, and maintainability (RAM) measurements completed during circuit switch DT II indicated that both the 300-line and 600-line configurations can satisfy operational requirements. Inherent availability was .9971 and .9977 for the 300-line and 600-line configurations, respectively. The mean time between unscheduled maintenance actions (MTBUMA) was 52.5 hours. Organizational maintenance level mean time to repair (MTTR) figures were 57 minutes and 39 minutes for the 300-line and 600-line configurations, respectively. These MTTR figures are being improved by corrections in the production models. Logistics supportability is adequate, particularly when the hardware design is corrected for maintainability.

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Project: #D222
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problems. Maintenance personnel utilized during the test held appropriate MOS and had been trained at the contractor's plant or at the US Army Signal Center and Fort Gordon (USASC&PG), Fort Gordon, GA.

(U) Due to hardware commonality, both the message switches and circuit switches tested in DT II and Operational Test (OT) II were similar for all intents and purposes and production models will not differ significantly from FSED models. However, software changes in the message switch are being introduced as improvements/changes dictate.

(U) Environmental qualification testing of the AN/TTC-39 showed 3 areas of deficiency--low-temperature capability, fungus, and heating and cooling capability. Corrective action is being implemented on the production model.

2. (U) Operational Test and Evaluation: The OT II of the AN/TTC-39 circuit switch commenced on 13 Nov 1979 and was successfully completed on 20 May 1980. The objectives were to provide information to assess: (1) the operational effectiveness of the AN/TTC-39 circuit switch, (2) the suitability/adequacy of personnel selection and training criteria for operational requirements, (3) the operational reliability, availability, and maintainability (RAM) and its impact on operational performance and logistics support, (4) on the operational effectiveness of logistical concepts, and (5) the operational effectiveness, suitability, and interoperability with the present inventory systems as well as the other TRI-TAC developments. The Independent Evaluation Reports from the different Services have indicated that the system and software that was tested was effective for employment within each service's range of operational requirements.

(U) During OT II, several areas were identified as needing improvement. These areas were: training, documentation, and software. The US Army Signal Center is preparing a new Program of Instruction (POI) to correct training deficiencies found during test. The other Services along with the Army have elected to convert the documentation to skill performance aids (SPA) format. This action along with the incorporation of field-recommended changes to publications will be used in the manual validation scheduled for July 1981. The software corrections are being implemented on a time-phased basis so that baseline performance may be achieved without serious impact on switch utilization at the Joint Test Bed. The first delivery of the incremental software is scheduled for November 1980. essentially the same as the production models.

(U) All subsystems and support equipment were available for testing during DT II and OT II, with the exception of the AN/MSM-105 automatic test equipment.

(U) OT II was accomplished by the United States Army Operational Test and Evaluation Agency with support of the TRI-TAC Joint Test Organization at Fort Huachuca, AZ. The United States Air Force, United States Navy, United States Marine Corps, and the National Security Agency participated in the conduct and evaluation of the tests.

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Project: #0222

Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39

Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Program

(U) Interoperability tests and scenario play were also conducted with the Naval Telecommunications System Test Node at San Diego, CA, and displacements to CONUS-based United States Air Force bases were made to simulate tactical airbase operations. IOTE for the AN/TTC-39 circuit switch was conducted by the US Army Operational Test and Evaluation Agency (OTEA). Testing was performed by military personnel from representative communications units. Contractor support continued during testing.

(U) The Circuit Switch OT II was conducted with inventory transmission and control equipment in seven scenarios. During this period 2 each 300-line and 2 each 600-line circuit switches were utilized.

(U) Follow-on testing of the circuit switch is required by the language in the DSARC III SDDM. However, the Army and Air Force independently plan to conduct (under the management of the US Army OTEA and Air Force Test and Evaluation Center) user-oriented follow-on evaluations to determine the effectiveness of implemented corrective actions.

(U) Operational reliability, availability, and maintainability (RAM) measurements.

(U) o Availability - The circuit switches demonstrated an operational availability of .9975 and .9991 for the 600-line and 300-line switches respectively. The message switch demonstrated an operational availability of .963.

(U) o Maintainability - The circuit switch did not achieve the criterion for organizational level nor direct support level maintenance during OT II. Based on improvements in documentation and training and hardware corrections in the production models, it is estimated that the mean-time-to-repair will be 30 minutes at organizational level and 60 minutes at the direct support/general support level. Based on the high mean time between mission failure (MTBMF) exhibited during OT II, the Army user community has indicated these new values are acceptable. These new values will be demonstrated during the follow-on evaluation currently scheduled for Dec 83. The message switch demonstrated acceptable maintainability performance during OT II.

(U) o Reliability - During the 4000-plus hours of operational testing, the circuit switch demonstrated an MTBMF of 400 hours (for failures of 100-percent degradation lasting more than 15 minutes). However, software anomalies contributed significantly to the mean time between unscheduled maintenance actions (MTBUMA) figure of 52.5 hours. Software corrective action is underway. During operational testing, the message switch demonstrated an MTBUMA of 220 hours.

1. (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 and the DSARC

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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 Program

III for the AN/TTC-39 Circuit Switch. The demonstrated performance characteristics listed below have been derived from Government-witnessed Contractor Development Testing (CDT), DT II and/or OT II.

OPERATIONAL/TECHNICAL CHARACTERISTICS

<u>CHARACTERISTICS</u>	<u>OBJECTIVES</u>	<u>DEMONSTRATED PERFORMANCE</u>	
<u>AN/TTC-39 CS (600-Line/300-Line)</u>			
Inherent availability (hrs) (1)	.999/.999	DT II .9958/.9948	OT II .9975/.9991
Mean time between failure (hrs)	20/20 (2)	18/24	52.5 (5)
Mean time to repair (min) (organizational/DS)	30/30	39/51	44 (5)
Mean time to repair (min) (CS)	60/60	Not measured	122 (5)
Simultaneous conferences (1)	6/4	6/4	4 (5)
Maximum conferees per conference (1)	20/20	20/20	6 (5)
Alternate routing (1)	up to 5/5	up to 5/5	5 (5)
Standby battery power (min)	15/15	20 (lead acid)	Not measured
Terminations per module	150/150	192/192	Not measured
Maximum weight per shelter (lbs)	7000/7000	6709/8386	6709/8386
<u>AN/TTC-39 Message Switch (50-Line)</u>			
Inherent availability (1)	.9999	.99927	.963 (6)
Mean time between failure (hrs)	20	30.2	220 (7)
Mean time to repair (Organizational/DS) 30 min		2.03 hrs	58.5 min
Mean time to repair (CS)	60	Not measured	50.6 min
Reference storage (days) (1)	10	10	10
Journal storage (days)	30	30	30
Standby battery power (min)	15	16.26	Not measured
Message processing time (sec) (3)	2	1.732	Not measured
Throughput character per second	9900	9534	Not measured
Bit error rate per consecutive bits	10 ⁻¹⁰	10 ⁻¹⁰	Not measured
Maximum weight per shelter (lbs)	7000	6840	6840

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Project: #D222

Program Element: #2.80.10.A

DOD Mission Area: #256 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39

Title: Joint Tactical Communications (JTC) Program

Budget Activity: #4 - Tactical Program

NOTES:

- (1) (U) DCP performance features for which minimum thresholds for the Army have been established.
- (2) (U) Mean time between failure is not an explicit FSED specification requirement. However, the production contract has specified an MTBF of 10 hours.
- (3) (U) Two seconds represent a mean message processing time.
- (4) (U) Demonstrated performance will be based on the results of Government testing to be conducted during DT/OT II and CDT.
- (5) (U) Figures based on average of 600-line and 300-line switch.
- (6) (U) 0.961 is a measure of operational availability and includes maintenance and supply time.
- (7) (U) This is a measure of Mean Time Between Unscheduled Maintenance Activities (MTBUMA) (i.e., 80% probability of completing a 48-hour mission).

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FY 1982 RDT&E 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	22080	25742	37558	50128	Continuing	Not Applicable Diverse Items
D253	Defense Satellite Communications System- Defense Communications System (DSCS-DCS) (Phase II)	6490	14194	21011	22514	Continuing	Not Applicable
D450	Satellite Communications	500	753	951	1146	Continuing	Not Applicable
D456	Tactical Satellite Communications (TACSATCOM)	15090	10795	15596	468	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, an Army responsibility for all Services/Agencies. Existing communications facilities supporting the strategic and tactical command and control requirements of the National Command Authority, the Defense Communications System (DCS), and tactical commanders do not have the capability nor survivability that is needed. Efforts in this program are to improve non-line-of-sight systems, to significantly limit their vulnerability to enemy jamming, and to explore new frequency ranges for more efficient use of satellite resources, thereby enhancing command and control in support of the highly fluid tactical operations expected on the modern battlefield.

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Program Element: 03.31.62.A
DOD Mission Area: 0256 - Tactical Communications

Title: Satellite Communications Ground Environment
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1982 RDT&E REQUEST:

1. (U) Project D253-Defense Satellite Communications System (DSCS): Funding is required to complete the system design of the Real Time Adaptive Control System (RTACS). Begin preparation of application software and hardware procurement. 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. Initial tests will be conducted with an Extra High Frequency (EHF) processing package scheduled for launch on a host vehicle in 1986. Award engineering development contract for jammer detection and discrimination. Continue engineering development contract for 0.9 forward error correcting coder. Continue contract for software validation and verification (V&V). Initiate engineering development contract for limited net control for mobile and transportable terminals.

2. (U) Project D456-Tactical Satellite Communications (TACSATCOM): Funding is required to complete engineering development of the anti-jam capability which is critical for continuous operation of the multichannel initial system during jamming conditions. Funding will provide for continuation of an advanced development and logistic support effort which will provide a highly jam-resistant single-channel objective tactical terminal (SCOTT). Funding to complete AD of Multichannel, Super-High Frequency Demand Assigned Multiple Access (MC-SHF DAMA) Modem. This multichannel effort will, among other things, increase the efficient use of expensive satellite resources by a factor of four. Continue engineering development effort for quick-erect antenna.

3. (U) Project 450-Satellite Communications: Complete 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. Investigate advanced manpack, unattended earth terminal and K-band space diversity.

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Program Element: #3.31.42.A
DOD Mission Area: #256 - Tactical Communications

Title: Satellite Communications Ground Environment
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>FY 1983</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	22080	25742	37558	50128	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	20090	26681	40765	-	Continuing	Not Applicable

FY80 increase shows cost growth in A/J Modem development. Also reflects some realignment between 0203 and 0450, discussed in those sections. Decrease in 81 is due to the application of general Congressional reductions. FY82 decrease reflects different approach on development of 30/20 GHz terminals requiring less funding in first year; DCA assumption of responsibility for Engineering Development Models of Satellite Configuration Control Element equipment and discontinuance of the adaptive channelized bandpass attenuator as infeasible.

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
Other Procurement, Army:						
Funds (current requirements)	130200	163800	137600		Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	137000	161800	169100	--	Continuing	Not Applicable

Quantities*

*Large number of diverse items.

The Defense Satellite Communication System (DSCS) procurement funds reduction resulted from deferring the FY 1982 requirement for Medium Transportable Terminals to FY 1983. The Tactical Satellite Communications (TACSATCOM) FY 1982 procurement

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Program Element: 03.31.42.A

DDO Mission Area: 0256 - Tactical Communications

Title: Satellite Communications Ground Environment

Budget Activity: 04 - Tactical Programs

funds have been decreased from the FY 1981 submission due to deferring of AN/MSC-65 production contract and Network Control Modem Antijam (A-3) with minor adjustments in the DSCS lines.

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Program Element: #3.31.42.A
DOD Mission Area: #256 - Tactical Communications

Title: Satellite Communications Ground Environment
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The capability to provide rapid, reliable communications, command and control--especially in a hostile environment--presently does not exist. This program includes the development of strategic and tactical ground terminals for use with satellite communications systems. The two principal projects included in this program element (PE) are: the Defense Satellite Communications System (DSCS) Phase II and the Tactical Satellite Communication System (TACSATCOM) (D456). 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 equipment suitable for TACSATCOM and other satellite applications, are conducted within the Satellite Communications Project D450. The emphasis is to improve efficient use of resources in these non line-of-sight systems, enhance their ability to operate in a stressed (jamming) mode and explore a new frequency range for relief on spectrum congestion and overall system improvement.

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 (SATCOMA) 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 1980 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, which significantly increases the number of subscribers handled by same satellite. In FY 1973, engineering development of the AN/USC-28 Spread Spectrum (for anti-jam capability) equipment and the Light Terminal was initiated. In FY 1974, an engineering development contract was awarded for

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Program Element: #3.31.42.A
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Title: Satellite Communications Ground Environment
Budget Activity: 14 - Tactical Programs

Quadrature Phase Shift Keying (QPSK) equipment, a modulation technique which greatly improves efficient use of satellite resources. 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. (G/T is a figure of merit for antennas, the bigger the number the better the antenna. Current technical limit is between 40-45). These antennas were completed in FY 1976 and 1977, respectively. Development of the AN/USC-28 was completed in FY 1977. Design approaches for Burst Error Correction equipment (protection of message against short, random-burst interference, natural or manmade) and low-rate multiplexer to interface low-rate data users to high-rate data transmission of the system 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. The PCS provides significantly improved management of available channels on a satellite. Contracts were also awarded for extension of the PCS, continuation of the Low-Rate Multiplexer, development of a Conferencing (interface with Navy-developed SVCC equipment) and Beacon Entry capability (will provide system entry with full A/J for the AN/USC-28), advanced development of a Burst Error Correction Coder, interface of the Satellite Configuration Control Element (SCCE), which will provide automatic satellite control and enhanced management capability of the communications channels, 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. In 1980 a major addition was the JRSC program which resulted in awards for additional AN/USC-28's, AN/TSC-86 (light terminal), and associated equipment.

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) (a modem for TSC-85 for traffic from "spoke" TSC-93's) 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 (AO of A/J modem now in ED at Harris) 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) (monitors communication links for control manual control of traffic) was type classified Standard. In FY 1978, an engineering development contract for the

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Budget Activity: #4 - Tactical Programs

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 with associated equipment.

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 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 with associated equipment.

2. (U) FY 1981 Program:

a. (U) Project D253-Satellite Communications System (DSCS): Award the system design contract for the Real Time Adaptive Control System (RTACS), which will enhance the operation with the DSCS III satellites scheduled for early CY 1983 launch. RTACS essentially automates execution of the instructions developed by the SCCE for management of the traffic on the satellite. Engineering development efforts for the adaptive power control equipment, to provide automatic terminal power adjustment with changing traffic load, will be initiated. Begin narrowband engineering development for jammer detection and discrimination via MIPR to Navy. Begin development of a newer technology forward error correction coder (rate .9 coder).

b. (U) Project D456-Tactical Satellite Communications: Continue engineering development efforts of the antijam control modem for the multichannel initial system (MCIS) terminals. Conduct demonstration of validation model of a DAMA modem for Multi-Channel Objective System (MCOS) as well as complete system design plan effort and prepare for ASARC I. Initiate Engineering Development (ED) of a new antenna system for TACSATCOM terminals (higher gain--increasing capacity of

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Budget Activity: #4 - Tactical Programs

TSC 85/93 and quick erect (1 hour vice 24 hours) for gain available). Initiate Advanced Development (AD) and logistic support effort for Single Channel Objective Tactical Terminal (SCOTT).

c. (U) Project D450-Satellite Communications: Continue electromagnetic compatibility analysis of the ground mobile forces satellite communications terminals. Initiate 30 GHz transmitter feasibility model development to increase anti-jam protection in the uplink.

3. (U) FY 1982 Planned Program:

a. (U) Project D253-Defense Satellite Communications System (DSCS): Funding is required to complete the system design of the Real Time Adaptive Control System (RTACS), and begin preparation of application software and hardware procurement. 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 in the Extra High Frequency (EHF) range. Award engineering development contract for jammer detection and discrimination. Continue engineering development contract for 0.9 forward error correcting coder. Continue contract for software verification and validation. Initiate engineering development contract for limited net control for mobile and transportable terminals.

b. (U) Project D456-Tactical Satellite Communications (TACSATCOM): Funding is required to complete engineering development of the anti-jam capability which is critical for continuous operation of the multichannel initial system during jamming conditions. Funding will provide for continuing of an advanced development and logistic support effort which will provide a highly jam-resistant single-channel objective tactical terminal. Funding also supports system engineering 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. Continue engineering development effort for quick erect antenna.

c. (U) Project 450-Satellite Communications: Complete 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 interface interference. Investigate advanced man-pack, unattended earth terminal and K-band space diversity.

4. (U) FY 1983 Planned Program:

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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. Continue ED and begin DT II of a limited network control element for use with Worldwide Military Command and Control System (WMCCS) Transportable Terminals. Continue software verification and validation SETA effort. Continue wideband ED effort and begin narrowband DT II for jammer detection and discrimination. Complete ED of rate 0.9 forward error correcting coder. Award contract for Spread Spectrum Multiple Multiple Access Power Combiner.

b. (U) TACSATCOM: Single Channel Objective Tactical Terminal (SCOTT) continues with ASARC II, initiate full-scale development and satellite simulator to be used for test purposes and as a prototype for the space package effort. Continue Multichannel Objective System (MCOS) advanced development, and initiate simulator fabrication. Continue ED for Quick Erect Antenna.

c. (U) Satellite Communications: Complete K-band diversity investigation; continue investigations unattended earth terminal; initiate contracts on downlink AJ investigation, advanced AJ techniques, advanced modulation techniques, and for a 100 MBS Modem.

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

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Program Element: #1.11.42.A
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Title: Satellite Communications Ground Environment
Budget Activity: #4 - Tactical Programs

E. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (U) Within Tactical Satellite Communications (TACSATCOM), four projects are in various phases of development. The Multichannel Objective System (MCOS) is in the conceptual phase during which a test program will be defined, and the Quick Erect Antenna is scheduled for DT/OT II in the 3-4Q FY83, but may be procured as a nondevelopmental item (NDI). These two projects will not be discussed further.

b. (U) The Single-Channel Objective Tactical Terminal (SCOTT) is an Extremely High Frequency (EHF) tactical satellite communications terminal planned for deployment in the 1990's. SCOTT will enter Advanced Development in FY81 at MIT's Lincoln Laboratory at Hanscom, AFB, MA. No testing has been done to date. A combined DT/OT I is scheduled for Sep-Oct 82. Two Advanced Development Models (ADM's) of the SCOTT, one rack-mounted in the laboratory and one in a command post tracked vehicle (M577) outside the laboratory, will be used for testing. The ADM's are intended to demonstrate the feasibility of the technical design and will not represent the final configuration, which will be determined in Full-Scale Engineering Development (FSED). Lincoln Labs will conduct SCOTT DT I witnessed by TECOM. OT I will be conducted by OTEA. Testability of the SCOTT using automatic test equipment will be demonstrated in DT/OT I as confirmation of the logistics concept. A reliability, availability model will be run on the ADM components, and prediction results will be used to suggest design changes to improve system reliability in FSED. The SCOTT ADM's will not be packaged to withstand environmental testing--this will be accomplished in DT/OT II.

c. The Antijam (A/J) Modem which is in Engineering Development, provides ECCM capability for the multichannel Initial systems (MCIS-AN/TSC-85/91). DT II is scheduled for February 1982. Modem is being developed under contract to the Harris Corp., Melbourne, FL, by the PM, SATCOM. The test sequence has been arranged to conduct all DT tests in conjunction with the Preliminary Qualification Test-Contractor (PQT-C) with the exception of EMC, EMI, and verification of the TRI-TAC interface suitability. These tests will be accomplished during PQT-Government (PQT-G). DT/OT II testing will not include a TRANSEC unit due to nonavailability. The TRANSEC unit is a requirement that developed after initiation of this program. It is a plug-in and will have no effect on testing of this project. DT II will consist of systems test conducted on site at USASATCOMA, Ft Monmouth, NJ, PQT-C at the contractor facilities in Melbourne, FL, and PQT-G at the Army Electronic Proving Ground, Fort Huachuca, AZ. Tests will be conducted by the AF, MC, Army Communications Electronics Board (ACEB), TRADOC System Manager (TSM), and Army Communications (ACC). The nine (9) models of the A/J Modem provided for DT II tests will be identical with the production configuration of the modem.

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2. (U) Operational Test and Evaluation:

a. SCOTT OT I was discussed in conjunction with Development testing above. OT II will be performed by military personnel typical of those user units slated to receive the SCOTT.

b. A/J Modem OT II is scheduled for the October to December 1982 timeframe. Test will be conducted concurrently with the Follow-On Evaluation (FOE) of the AN/TSC-85 and AN/TSC-91. The Army Communication Electronic Board (ACEB), Ft Gordon, GA, has primary responsibility for the test. ACEB will organize the test directorate, and the test will be conducted at their facilities at Ft Bragg, NC. The Army Communications Command (ACC) has primary OT responsibility for the AN/MSQ-114 control terminal in which an A/J modem will be installed. USMC and USAF will provide input and participate in those tests of Tri-Service interest. Nine modems will be utilized in the test and will be the same configuration as the production modems. Military support will be personnel similar to those in units which will use this equipment.

3. (U) System Characteristics:

a. SCOTT - all characteristics to be formally demonstrated in DT/OT I. High ECCM will be accomplished utilizing fast frequency hopping. An automatic satellite tracking and acquisition antenna will be tested.

b. A/J Modem. The design anti-jam margin and full system acquisition synchronization have already been demonstrated. Work to decrease power consumption continues and design value is expected by DT/OT II testing.

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FY 1982 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 Communications Agency (DCA) and approved by the Office of the Secretary of Defense (OSD). The Phase I DSCS ground complex consisted of two types of 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 employing the Pilot Control System for limited 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 to include automated reaction to jamming. 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, anti-jam 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, programmable multiplexer that will be used for low-data-rate users providing an ability to change data rates without manual reprogramming. It provides an alternative to existing new equipment and is to be used with the USC-28. The Burst Error Correction Coder provides both

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Project: #D253

Program Element: #3.31.42.A

DOD Mission Area: #256 - Tactical Communications

Title: Defense Satellite Communications System
Defense Communications System (Phase II)

Title: Satellite Communications Ground Environment
Budget Activity: #4 - Tactical Programs

forward error correction coding and protection against burst jamming. It is needed for use with the AN/USC-28. The 10/20 GHz terminal and modulation developments will make it possible for certain of the DSCS users to operate in the less crowded K-band. The Limited Network Control Element will provide mobile, less vulnerable facilities as an alternative to the fixed facilities provided as part of 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 Communications (JRSC) equipment being procured 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); Linkabit, La Jolla, CA, for the Burst Error Correction Coder and rate .9 coder; Magnavox Research Laboratories, Torrance, CA, for the spread spectrum conferencing and beacon entry capability for the USC-28; Harris Corporation, Melbourne, FL, for the Adaptive Link Power Control.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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) (technology to significantly increase subscriber using resources) capability. In FY 1973 engineering development of the AN/USC-28 Spread Spectrum (to provide A/J capability) equipment and the Light Terminal was initiated. In FY 1974 an engineering development contract was awarded for Quadra-Phase Shift Keying (QPSK) equipment (a modulation scheme to increase use of communications channels). The QPSK and AN/USC-28 are included in the Digital Communications Subsystems, 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 (G/T is a figure of merit for antennas, the higher the number the better. Current technical

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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

limit is about 40-45). These antennas were completed in FY 1976 and 1977 respectively. Development of the AN/USC-28 was completed in FY 1977. Design approaches for Burst Error correction (to provide protection against burst interference--natural or manmade) equipment and Low-Rate Multiplexer (to buffer low-rate users into the high-rate system) 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) (to provide more efficient management of communications channels) was completed. Contracts were also awarded for extension of the PCS, continuation of the low-rate multiplexer development, advanced development of a Burst Correction Coder, and interface of the Satellite Configuration Control Element (SCCE) and the AN/FSC-78 terminals. In FY80 the development of the PCS was continued to enable interim use of the system for the Atlantic satellite, as well as award of JRSC contracts for AN/USC-28, AN/TSC-86, and associated equipment. A contract was awarded for design of an Adaptive Channelized Estimator, and funds were provided for definition of the Batson II interface with the SCCE.

2. (U) FY 1981: The Real Time Adaptive Control System (RTACS) design contract will be awarded this fiscal year. Award software Verification and Validation/Systems Emergency Technical Assistance contracts. Award ED adaptive link power control, funds to Navy for jammer detection and discrimination narrowband. Award ED contract for rate 0.9. Forward error correcting coder (improved data error coding), appropriation for digital communication, JRSC. continue efforts in the production Spread spectrum multi-access, system control and MOD in service.

3. (U) FY 1982 Planned Program: Funding is required to complete the system design of the (RTACS) and begin preparation of application software and hardware procurement. 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 the 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 Extra High Frequency (EHF) space package scheduled for launch in 1986 on a host vehicle. Award engineering development contract for a jammer detection and discrimination. Continue engineering development contract for rate 0.9 forward error correcting coder. Continue contract for software Verification and Validation. Initiate engineering development contract for limited net control for mobile and transportable terminals. Complete ED contract for adaptive link power control. Continue production efforts for digital communication, JRSC, SSMA, system control and MOD in service.

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Project: #0253

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

4. (U) FY 1983 Planned Program: Continue Software Verification and Validation/Systems Engineering Technical Assistance contracts. Continue wideband engineering development effort for jammer detection and discrimination. Complete ED of rate 0.9. Forward error correcting coder. Award ED contract for 30/20 GHz terminals and modulation. Start DT II for limited network control element for mobile and transportable terminals. Continue ongoing production efforts for digital communication, JRSC, MOD in service, system control and SSMA. Award contract for SSMA power combiner.

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

6. (U) Major Milestones: Not Applicable.

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	6490	14194	21011	22514	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	8990	15188	22813	-	Continuing	Not Applicable
Quantities*						
Other Procurement, Army						
Funds (current requirements)	98200	103218	98700	164900	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	107000	104800	73900	-	Continuing	Not Applicable

* Large number of diverse items.

Decrease in FY80 RDTE funding was a reprogramming to D456, Tactical Satellite Communications, for A/J Modem increases, plus a reduction by a higher HQ. FY81 decreased due to the application of general Congressional reductions, and FY82 decreased due to different approach in 30/20 GHz terminals, elimination of adaptive channelized bandpass attenuator, and DCA assumption of responsibility on EDN's for SCCE.

FY80 procurement funds decreased due to reprogramming (TACFIRE) and slips in JRSC and SSMA programs. Procurement of PCS was eliminated. FY81 decreases reflect adjustments during the budgetary cycle, and FY82 increases are for catchup with JRSC procurement on the realignment of that program.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D456

Program Element: #3.31.42.A

DOD Mission Area: #256 - Tactical Communications

Title: Tactical Satellite Communication Systems

Title: Satellite Communications Ground Environment

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 manpack 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 1980 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

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Project: #D456
 Program Element: #3.31.42.A
 DOD Mission Area: #256 - Tactical Communications

Title: Tactical Satellite Communication Systems
 Title: Satellite Communications Ground Environment
 Budget Activity: #4 - Tactical Programs

1974, the RCA SHF small terminal contract was expanded to include an engineering development for an SHF Communications Control Facility 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) (a modem to interface "hub" and "spokes" of multichannel initial systems) to Martin Marietta Corporation, Orlando, FL; and UHF Manpack Transceiver to Cincinnati-Electronics, Cincinnati, OH. An advanced development contract was awarded for an Antijam/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/TSC-118) (monitors system links for communications channel management) was type classified. In FY 1978, an engineering development contract was awarded for an Antijam/Control Modem for the multichannel SHF initial terminals. Development Test/Operational Test II (DT/OT II) of the UHF Manpack System was initiated in FY 1978 and will continue into FY 1979. Engineering development was conducted on the Antijam (AJ)/Control Modem for the Multichannel Initial system terminals. In FY 1980 effort continued on AJ/Control Modem and award of the production contract for AN/TSC-85 and 93 (multichannel "hub" and multichannel "spoke") and associated equipment.

2. (U) FY 1981 Program: Continue AJ/Control Modem Contract. Award AD Contract for Single-Channel Objective Terminal. Complete terminal system design plan effort for Multichannel Objective System (MCOS), the multichannel system of the 1990's. Award ED Contract for Quick Erect Antenna (a higher gain antenna erectable in one hour or less, significantly increases capacity of the system.) Continue contractual effort in production for AN/TSC-85 and 93. Award contract for PSC-1 manpack, and VSC-7, vehicular terminals. Continue funding AN/MSC-64 (single-channel UHF Special Communications System).

3. (U) FY 1982 Planned Program: Funding is required to complete engineering development of the antijam capability which is critical for continuous operation of the multichannel initial system during jamming conditions. Funding will provide for continuing of an advanced development and logistic support effort which will provide a highly jam-resistant single-channel objective tactical terminal. Funding also supports system engineering 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. Continue Engineering Development effort for Quick Erect Antenna. Continue funding for production Contract AN/TSC-85 and 93.

4. (U) FY 1983 Planned Program: Conduct ASARC II for Single-Channel Objective Tactical Terminal (SCOTT). Continue advanced development of Multichannel Objective System (MCOS); continue ED contract for Quick Erect Antenna, continue funding of production Contract AN/TSC-85 and 93.

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Project: #D456

Program Element: #1.11.42.A

DOD Mission Area: #256 - Tactical Communications

Title: Tactical Satellite Communication Systems

Title: Satellite Communications Ground Environment

Budget Activity: #4 - Tactical Programs

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.

6. (U) Major Milestones: Not Applicable.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	15090	10795	15596	26468	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	11100	10693	16815	-	Continuing	Not Applicable
Quantities *						
Other Procurement, Army:						
Funds (current requirements)	30800	60474	47300	33800	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	30800	59000	95200	-	Continuing	Not Applicable
Quantities *						

*Large number of diverse items.

FY80 R&D increases reflect cost growth in the A/J Modem. Funds provided by reprogramming from NAVSTAR Global Positioning System and from Defense Satellite Communications System. Increase in FY81 attributable to inflationary adjustments and the amended budget request. FY82 decreases occurred during budgetary cycle adjustments. FY81 procurement increase reflects modification of two HSC-64's to provide interim control capabilities until HSC-40 is available.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.45.A

Title: European Command; Command, Control, and Communications Systems (EUCOM C³ 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	0	2012	18028	2064	11326	19494
DH58	EUCOM C ³ Systems	0	2012	18028	2064	11326	19494

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports a continuous effort in response to the Deputy Secretary of Defense tasking for the Army to examine the entire Command, Control, and Communications (C³) structure in Europe and propose options for improvements. A Joint Chief of Staff (JCS) study was initiated in 1974 on the C³ picture in Europe. The study identified deficiencies requiring research development and acquisition initiatives toward the most cost-effective means of improving the European C³ picture. A 2 May 1979 Assistant Secretary of Defense (Communications, Command Control & Intelligence) (ASD C³I) 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 two communications networks support the European nuclear weapons storage sites, an HF radio net, and a voice console system with circuits primarily traversing the Defense Communication System (DCS) network. An Ultra High Frequency (UHF) satellite net which augments the CEMETERY net and the European Command and Control Console System is anticipated to be operational in FY82. 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 C³ requirements necessary to establish an efficient, responsive, and survivable communications system to support the nuclear weapons storage sites.

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Program Element: #3.31.45.A

Title: European Command; Command, Control, and Communications Systems (EUCOM C- Systems)

DOD Mission Area: #251 - Theater Command and Control

Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Funding in FY 1982 will complete the near-term HF radio upgrade and fund contract award for mid-term mobile HF radio equipment. Fielding of the UHF satellite ground terminals in Europe will continue. Long-range research and development studies to assess communication needs for delivery units in post-1990 timeframes. Sites south of the Alps will continue to be evaluated, and additional sites will be considered. Ground mobile command post concepts will be developed.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Total Additional To Completion	Estimated Cost
RDTE					
Funds (current requirements)	0	2012	18028	14716	19494
Funds (as shown in FY 1981 submission)	1000	2309	2612	1300	14086

Increased funds in FY 1982 result from a posting error in the data base. Total FY 1982 RDT&E funds should read 4069, the remainder being procurement funds erroneously posted to the RDT&E account. That increase over the FY 1981 submission is to accelerate development of ground mobile command post concepts. Decrease in FY 1981 and FY 1980 due to program slippages.

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

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Program Element: #3.31.45.A

Title: European Command, Command, Control, and Communications Systems (EUCOM C- 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 (C³) 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 C³. 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 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 C³ requirements necessary to establish an efficient and survivable C³ 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 NWS 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 Nuclear Weapons Site (NWS) communications support would be accomplished in three phases, near-term (FY79-81), mid-term (FY82-85) long-term (FY86 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 (WMCCS) 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, NJ, Harris Corporation, Rochester, NY, Techdyne Systems, Alexandria, VA, Magnovox, Fort Wayne, IN. Developing Organization, US Army Communications Command, Fort Huachuca, AZ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: The FY78 program analyzed the results for the collation and European C³ enhancement. Specific areas were: Communication Security (COMSEC) design of methods equipment and procedures for necessary

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Program Element: #3-31.45.A

Title: European Command; Command, Control, and Communications Systems (EUCOM C- 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 C³ requirements. Reprogramming of FY 1979 funds to initiate improvements in the Cemetery Net was approved by Congress.

2. (U) FY 1981 Program: The FY 1981 program will complete installation of improved HF radio and associated console equipment; installation and test of the secure record capability for the European Command Control Console System (ECCS) will be finalized. Any unresolved requirements arising from the near-term improvement program to include the activation of the additional sites south of the Alps will be completed.

3. (U) FY 1982 Planned Program: Efforts in FY 1982 will focus on contract award for the midterm mobile High Frequency (HF) radio capability. Equipment will provide reduced Radio Frequency (RF) signature while in transit, secure antijam links between field storage sites, delivery units, and command headquarters. Ground satellite terminals fielding and Initial Operational Capability (IOC) is anticipated during the fiscal year. Long-range research and development studies to assess communications needs for delivery units/storage sites in post-1990 timeframe will be initiated. Development of concepts for ground mobile command posts will be initiated.

4. (U) FY 1983 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 midterm AFSATCOM systems to proposed Strategic Satellite System (SSS).

5. (U) Program to Completion: Focus on strategy to provide a new Nuclear Weapons Site (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.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.12.A

DOD Mission Area: #321 - Navigation and Positioning Fixing

Title: Mapping and Geodesy

Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	2094	0	1062	0	Continuing	Not Applicable
							1
							1
0580	Field Army Mapping	2094	0	1062	0	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element supports the advanced development and testing of equipment and techniques in support of the field Army in the areas of navigation and position fixing, mapping, and geodesy. This program addresses the development of continually increasing Army capabilities to generate and disseminate up-to-date general and special purpose map data which will enable commanders to use the terrain to their advantage and to provide coordinates, elevations, and azimuths quickly and accurately enough to allow artillery fires to be delivered for maximum effect. A Letter of Agreement (LOA) requirements document for the development of a Quick Response Multicolor Printer (QRMP) states that there is an immediate need to develop a QRMP capability to meet military requirements during the 1982-1990 period for multicolor reproduction of large items, such as topographic maps, terrain intelligence information, overlays for existing maps, photography, etc., in limited quantities, and in a timely and cost-effective manner. The present single-color lithographic system economically produces only large quantities of such products. It does not provide the tactical commander with the required quick response, nor does it efficiently perform low-volume multicolor tasks. Technology to meet the current Army requirements is available. The QRMP is a key development which will increase significantly the Army's capability to produce copies of topographic, photographic, cartographic terrain intelligence and other printed matter directly from a wide range of input. Its size, simplicity of operation, and relative mobility will make it one of the most important topographic equipment developments since World War II.

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Program Element: #6.37.12.A

DOD Mission Area: #321 - Navigation and Positioning
Fixing

Title: Mapping and Geodesy

Budget Activity: #5 - Intelligence and Communications

C. (U) BASIS FOR FY 1982 RDTE REQUEST:

FY 1982 RDTE funds are needed for the third increment of the contract for the development of the QRMP and the in-house work associated with monitoring the contract and administering the development program.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Complete DT 1/OT 1 of QRMP	3Q FY 1983	3Q FY 1983

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	2094	0	1062	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	930	0	718	Continuing	Not Applicable

FY 1980 RDTE funding was increased significantly by reprogramming to begin advanced development of the Quick Response Multicolor Printer (QRMP).

FY 1982 RDTE funding was increased by reprogramming to continue advanced development of the QRMP.

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

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Program Element: #6.37.12.A

DOD Mission Area: #321 - Navigation and Positioning
Fixing

Title: Mapping and Geodesy

Budget Activity: #5 - Intelligence and Communications

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The need for a faster way of copying topographic maps and map overlays was identified in an official post-war study of World War II map usage. The study revealed that only 10 percent of topographic maps available in the European Theater of Operations had been used. Compiled and printed in advance, these maps became obsolete by the time they were needed for military engagements. The Army's need for quickly reproduced, up-to-date maps is even more acute today. Commanders require printed maps overlaid with current information on enemy dispositions, damage to routes, and many other recent changes in the ground on which the battle will be fought. Currently, tactical overlays are drawn in color on transparent sheets. The drawback to using transparent overlays with printed maps is that they cannot be duplicated quickly in the field. Each additional copy of the overlay must be redrafted by hand. The Army's doctrine currently stresses quick-reaction, combat-oriented, low-volume compilation, reproduction, and distribution of terrain intelligence support to the Intelligence Preparation of the Battlefield (IPB), primarily in graphic form. Current Army topographic equipment to accomplish the reproduction portion of this process is the traditional offset, single-color, high-speed printing press designed for large-volume production normally associated with map depot stock supply and/or replenishment. These aging presses, which are costly to maintain, cannot provide the tactical commander with the required quick response, nor do they efficiently perform low-volume multicolor tasks. Technology to meet the current Army requirements for graphic products in a more timely and cost-effective manner is now available. This program is to develop a Quick Response Multicolor Printer (QRMP) which will permit rapid reproduction of relatively small quantities of topographic, cartographic terrain intelligence and other printed matter directly from a wide range of input. It will also be capable of printing overlay information on existing printed products, in limited quantities, and in a timely and cost-effective manner. The QRMP is needed to eventually replace the current topographic printing press as the reproduction equipment to direct support topographic units. The LDA requirements document indicates that the QRMP will be employed at division, corps, and theater Army level.

G. (U) RELATED ACTIVITIES: The Army works directly with the Air Force, Navy, and Marine Corps, and under the coordination of the Defense Mapping Agency (DMA) and the Director of Defense Research and Engineering in the functional area of Mapping and Geodesy. 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.A, Mapping, Charting and Geodesy Engineering Development and Test; Army Program Element 6.27.07.A, Mapping and Geodesy; and Army Program Element 6.47.16.A, Mapping and Geodesy.

H. (U) WORK PERFORMED BY: This program is the responsibility of the US Army Engineer Topographic Laboratories (USAETL) at Fort Belvoir, VA, with development support by contractors. The major contractors are: Litton Systems, Incorporated, Woodland Hills, CA; IDEAS, Incorporated, Beltsville, MD; Bausch and Lomb, Rochester, NY; DMA Inc., Melbourne, FL; and Xerox Corp., Pasadena, CA.

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Program Element: #6.77.12.A
DOD Mission Area: #321 - Navigation and Positioning
Fixing

Title: Mapping and Geodesy
Budget Activity: #5 - Intelligence and Communications

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Initiated development of prototype special map productions in 1970. Design and development of a prototype Position and Azimuth Determining System (PADS) was initiated in 1971. Prototype special map products to support battlefield sensor, Infantry, and airmobile operations were completed in FY 1972. In 1974 completed the test, evaluation, and trade-off analysis for the Jeep-mounted PADS. Initiated contractual studies and experimentation on the problems of operating a PADS in a helicopter. In 1975, completed studies on helicopter operation of the Position and Azimuth Determining System. Initiated advanced development of an Advanced Analytical Photogrammetric Positioning System. In FY 1976, completed component studies for development of a Forward Observer Vehicle Kit and assembled an in-house correlation facility to support development of a target reference scene generation capability for the Pershing II missile. Hardware to demonstrate the Army Terrain Information System concept was procured. In FY 1977, began contractual development of the Advanced Analytical Photogrammetric Position System. In FY 1979, completed contractual development of the Advanced Analytical Photogrammetric Positioning System. In FY 1980, began development of the Quick Response Multicolor Printer (i.e., the Engineer Typographic Laboratory awarded a contract to Xerox Corporation on 29 Aug 80 for its design and fabrication of QRMP prototype).

2. (U) FY 1981 Program: It is planned to increase the FY 1981 funding by reprogramming \$1999 thousand to provide the required funds to continue advanced development of the QRMP which was started in FY 1980. Continue Program Management and administrative activities. Provide funds for the second increment of the contract for the QRMP and continue to monitor the contractor's activities. A design and In-Process Review (IPR) of the QRMP will be conducted in the fourth quarter of FY 1981.

3. (U) FY 1982 Planned Program: Continue Program Management and administrative activities pertaining to the advanced development of the QRMP. Provide funds for the third increment of the contract for the QRMP and continue monitoring the contractor activities.

4. (U) FY 1983 Planned Program: Complete advanced development of the Quick Response Multicolor Printer. MERADCOM will: (1) conduct validation and In-Process Reviews of the QRMP; (2) complete contract funding of the advanced development phase of the QRMP; and (3) complete program management, administrative, and coordination activities related to the advanced development of the QRMP.

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Program Element: #6.37.12.A

DOD Mission Area: #321 - Navigation and Positioning
Fixing

Title: Mapping and Geodesy

Budget Activity: #5 - Intelligence and Communications

5. (U) Program to Completion: This is a continuing program. This program element also includes work on the following future Army systems: (1) Development of a system for Field Exploitation of Elevation Data (FIED), which will provide a capability to display elevation data in formats to facilitate its use in tactical planning; (2) an Advanced Analytical Photogrammetric Positioning System (AAPPS), which will cost-effectively provide position coordinates of friendly and target locations; and (3) other advanced components to improve the responsiveness and extend the capabilities of the Topographic Support System (TSS) and its subsystems. These systems will be conducted in the years FY 1984 through FY 1987. Other systems development such as the Low Cost Northseeker and advanced components for the TSS will take place in later years.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.01.A

DOD Mission Area: #121 - Navigation & Position
Fixing

Title: Aircraft Avionics

Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	1748	3729	11537	18685	Continuing	Not Applicable
	QUANTITIES						
DC95	Airborne Data Links	520	41	0	0	0	
DC96	Aircraft Navigation & Control Systems	0	2995	8644	16347	Continuing	Not Applicable
DC97	Avionics Systems	1228	693	2893	2338	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Due to the increasingly lethal environment in and over future battlefields caused by modern weapons, Army aviation must fly at nap-of-the-earth altitudes and provide force multiplying support to ground units day or night under any weather. This program element provides engineering development for data link, avionics, tactical navigation, and tactical instrument approach equipment necessary if Army tactical helicopters are to provide combat support down to nap-of-the-earth altitudes under adverse weather conditions, during day or night, and while simultaneously operating against sophisticated enemy air defenses and electronic warfare.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: The FY 1982 request supports engineering development of a low-altitude automatic map display, an integrated in-flight digital data bus tester to continuously monitor mission-essential electronics, and the A/ASN-132 Integrated Inertial Navigation System necessary for Special Electronic Mission Aircraft.

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Program Element: #6.42.01.A
 DOD Mission Area: #321 - Navigation & Position
 Fixing

Title: Aircraft Avionics
 Budget Activity: #5 - Intelligence and Communications

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	1748	3729	11537	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3056	4196	9065	Continuing	Not Applicable

Decreased funding in FY80 was made to finance higher priority programs. DC97 decreased by \$1.838 million through Army reprogramming of funds. Decrease of \$467 thousand in FY81 reflects the application of general Congressional reductions and reductions for efficiencies. FY82 increase is to accelerate the AN/ASN-132 navigation system to make its schedule compatible with the Quickfix program for which it is intended. Note: DC95 was previously reported as part of this PE but is now reported separately under Project under PE #6.42.21, Project D208, AN/UPD-7 Surveillance System.

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

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Program Element: #6.42.01.A
DOD Mission Area: #321 - Navigation & Position
Fixing

Title: Aircraft Avionics
Budget Activity: #5 - Intelligence and Communications

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Efforts under project DC97 center on applying the Integrated Avionics Control Systems (IACS) to new Army aircraft, and development of the microprocessor and data bus multiplexing to provide vital mission status information while monitoring all avionics equipment with significant saving of cockpit space. Other efforts include system installation and engineering support and developments in communications accessories and antennas, including radio processing and electronic warfare improvements. Under project DC96, an integrated navigation system (AN/ASN-132) is being developed to support Special Electronic Mission Aircraft (SEMA). Present SEMA missions use a twenty-year-old system which is heavy, costly and unreliable. The AN/ASN-132 will use current common components also used by the Air Force to make a precise navigation system ten times as reliable, half as heavy, and at half the cost of the older system. Beginning in FY83, this project will also support engineering development of the Joint Tactical Microwave Landing System (JTHLS) which is a triservice program managed by the Army designed to provide the military component of a worldwide common military and civilian instrument landing system.

G. (U) RELATED ACTIVITIES: In order to avoid duplication of effort, the Army will continue direct coordination, monitoring, and participations with other services, the Federal Aviation Administration (FAA), and the National Aeronautics and Space Administration (NASA). The Inertial Navigation System (AN/ASN-132) being developed under project DC96 takes advantage of Air Force standard components meeting form-fit-function (F) specifications developed in coordination with the Army. Development schedules and funding are being coordinated with the Air Force. Common components consisting of the inertial navigation unit (INU), cockpit display unit (CDU), and AN/ARN-118 TACAN will be procured through the Air Force via a Military Interdepartmental Procurement Request (MIPR).

H. (U) WORK PERFORMED BY: 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; Rolm Corporation, Santa Clara, CA; 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.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Completed production qualification and customer testing of the Integrated Avionics Control System (IACS). Prepared functional purchase descriptions and technical data packages for nap-of-the-earth

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Program Element: #6.42.01.A
DOD Mission Area: F321 - Navigation & Position
Fixing

Title: Aircraft Avionics
Budget Activity: 85 - Intelligence and Communications

communications engineering. Completed Advanced Development contract for one working model of the AN/ASN-132 in order to develop necessary software algorithms for integration of this inertial navigation unit with TACAN position updates. Completed verification flight testing of this prototype AN/ASN-132 at the Army Electronic Proving Ground, Ft. Huachuca, AZ.

2. (U) FY 1981 Program: Conduct in-house effort to define system integration and modification to adapt the current data link hardware to the OVI-HOHAWK application. Initiate the engineering development phase for the AN/ASN-132 Integrated Inertial Navigation System by contracting for ten systems for installation and test in actual mission aircraft.

3. (U) FY 1982 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 automatic map display. All necessary experimental work has been performed, and the proposed system is ready for full-scale development. Initiate program for an in-flight avionics data bus tester. Test software will be written, and experimental work will be performed to prepare the proposed system for full-scale development. Complete development of ten AN/ASN-132 Inertial Navigation Systems. Conduct flight environment qualification tests on non-Air Force-furnished items. Develop interim integrated logistics documentation. Install one system in Quickfix II prototype aircraft. Test and deliver six additional systems for operational evaluation.

4. (U) FY 1983 Planned Program: Continue advanced map display system development. Award an engineering development contract for the Single-Channel Ground and Airborne Radio System (SINGARS V) aircraft antenna. If necessary experimental work will be performed so that 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. Begin the Engineering Development phase of the Joint Tactical Microwave Landing System (JTMLS) with a contract for airborne and ground equipment.

5. (U) Program to Completion: This is a continuing program. Efforts include completion of engineering development of advanced map display, data bus controller Joint Tactical Microwave Landing System and transition to production. In response to user requirements, the program will develop air traffic control hardware to the point of production transition.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.16.A

Title: Mapping and 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	40	216	100	3611		
	Azimuth Determining Device (ADD)						5
	Digital Topographic Elevation Data Dubbing Facility (DTEDDF)						1
	Topographic Support System (TSS)						
	Interactive Graphics Equipment (IGE)						1
	Quick Response Multicolor Printer (QRMP)						2
	Terrain Analysis Module (TAM)						1
D579	Equipment Field Army Mapping Systems	40	216	100	3611	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This engineering development effort will allow the Army to achieve or exceed qualitative equivalence with Soviet fielded topographic support systems by 1985 and superiority through product improvement by 1990. The major overall deficiency of current Army topographic units and terrain detachments is their inability to provide the topographic products and services within the timeframe required to efficiently support Army combat operations. This program element encompasses RDTE funds for the engineering development and testing of materiel for rapid acquisition, processing, and dissemination of topographic map and position location data in the field Army to direct support of tactical deployment of forces and weapon system operation. The program element provides the necessary follow-on engineering development work of the systems and equipment originating in program element 6.37.12.A, including Field Army Topographic Support System, an Azimuth Determining Device, and the Quick Response Multicolor Printer. This work addresses present deficiencies in the Army's ability to provide topographic data and Field Artillery fire coordination in a timely manner consistent with rapid and effective combat operations. The US Army urgently requires a high quality Topographic Support System (TSS) that is capable of providing topographic products and services to the Army combat service support forces to replace equipment presently in the field that is of 1940 and 1950 vintage. The objective of this program is to design, develop, test, evaluate, and deploy

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Program Element: #6.47.16-A

Title: Mapping and Geodesy

DOD Mission Area: #321 - Navigation and Positioning
Fixing

Budget Activity: #5 - Intelligence and Communication

a system capable of providing topographic support, in the form of products and services, which is required by a tactical field commander. The TSS will provide, on a quick-response basis, those topographic products and services needed by the Commander in the field. These include Military Geographic Information (MGI) as well as surveying and mapping. The proposed TSS will also 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.

C. (U) BASIS FOR FY 1982 ROTE REQUEST: The FY 1982 ROTE funding request will allow the Army to monitor in-house engineering development efforts and equipment testing activities and to complete engineering development work on the Digital Topographic Elevation Data Dubbing Facility (DTEDDF). The DTEDDF will be capable of producing militarized cassette tapes necessary to provide the AN/TPQ-36 Mortar Locating radar and the AN/TPQ-37 Artillery Locating radar computer (FIREPINDER Systems) with the Digital Terrain Elevation Data (DTED) they require. The DTEDDF will be a highly mobile, van-mounted computer facility capable of reformatting DTED data from a commercial 9-track magnetic tape provided by the Defense Mapping Agency (DMA).

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Standardize Quick Response Multicolor Printer (QRMP)	4Q FY 1986	4Q FY 1985
Standardize Interactive Graphics Equipment (IGE)	4Q FY 1986	1Q FY 1988
Deploy Digital Topographic Elevation Data Dubbing Facility (DTEDDF)	3Q FY 1982	Not Shown

Delay in initial funding for advanced development of the Quick Response Multicolor Printer has delayed its expected completion date.

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Program Element: #6.47.16.A

Title: Mapping and Geodesy

DOD Mission Area: #121 - Navigation and Positioning
Fixing

Budget Activity: #5 - Intelligence and Communication

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	40	216	100	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	1528	232	1437	Continuing	Not Applicable

FY 1980 funding was reduced due to reprogramming of funds to Program Element 6.37.12.A to begin development of the Quick Response Multicolor Printer. FY 1982 RDTE funding was reduced for higher priority Army requirements.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
a. Position and Azimuth Determining System (PADS)						
Funds (current requirements)	14700	20000	4000	4800	274800	315700
Funds (as shown in FY 1981 submission)	14600	19500	19200	Not Shown	275500	361300
Quantities (current requirements)	30	60	12	12	825	948
Quantities (as shown in FY 1981 submission)	30	60	60	Not Shown	976	1135

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Program Element: #6.47.16.A Title: Mapping and Geodesy
 DOD Mission Area: #121 - Navigation and Positioning Budget Activity: #5 - Intelligence and Communication
 Fixing

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
b. Topographic Support Systems Funds (current requirements)		21500	26500	28900	38600	136500
Funds (as shown in FY 1981 submission)	0	20800	23800	Not Shown	35700	122500
					9 Equivalent Systems (TSS)	

Current revised FY 1980 and FY 1981 programs for PADS and Topographic Support Systems are based on actual contract award costs.

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Program Element: 6.47.16.A

DOD Mission Area: #321 - Navigation and Positioning
Fixing

Title: Mapping and Geodesy

Budget Activity: #5 - Intelligence and Communication

F. (U) DETAILED BACKGROUND AND DESCRIPTION: In recent years, dramatic technological advances in military sciences have been paralleled by advances in topographic capabilities, particularly in the acquisition of high-quality aerial photography and in the automation of much of the mapmaking process. However, the technology advance most significant to the support of modern weapons systems is the capability to routinely produce Digital Topographic Data (DTD). The Defense Mapping Agency (DMA) has recently developed a capability to furnish topographic data from maps and other sources in a digital format for computer use. There is one major Army system, currently in production, that has an urgent requirement for Digitized Terrain Elevation Data (DTED), a subset of Digitized Topographic Data (DTD). The AN/TPQ-36 Mortar Locating Radar and AN/TPQ-37 Artillery Locating Radar computers (for FIREFINDER Systems) use the DTED to perform a function called Automatic Height Correction (ACH)--a capability to automatically correct locations for altitude of the hostile weapon during system operation. The FIREFINDER Systems will be the first Army system to use this digitized terrain elevation data which will improve the effectiveness of FIREFINDER by increasing the accuracy and speed with which enemy gun positions can be located. The DTED Facility will use the master tape from DMA, in a predetermined format, on commercial magnetic tapes, and reformat them into militarized magnetic tape cassette that would be directly usable by the FIREFINDER Systems. The DTEDDF element provides engineering development of hardware and software for the generation of digitized terrain elevation data. Furthermore, the DTED Facility is so configured that it is capable of creating and maintaining an adequate master library of DTED files from which the FIREFINDER cassettes can be created. The DTEDDF mission is divided into three main functions: (1) DTED receiving and validation, (2) master library maintenance and cataloging, and (3) field tape dubbing and validation. The other objectives of this program are the engineering development and testing of materiel for Army survey and point positioning and compilation, revision, reproduction, and distribution of topographic information. These developments will be used in direct support of the tactical deployment of forces and the operation of weapons systems. This program element provides the necessary engineering development of the systems and equipment originated in Program Element 6.37.12.A, Mapping and Geodesy.

G. (U) RELATED ACTIVITIES: The Army works directly with the 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.

H. (U) WORK PERFORMED BY: This work is accomplished in-house at the US Army Engineer Topographic Laboratories (USAETL), Fort Belvoir, Virginia, with assistance from other Army elements, and by contractors under USAETL direction. The contractors are: Lear Siegler, Inc., Santa Monica, California; Bausch and Lomb, Rochester, New York; Litton Systems, Inc., Woodland Hills, California; Decilog Inc., Melville, New York; and Xerox Corporation, Pasadena, California.

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Program Element: 06.47.16.A

DOD Mission Area: 0321 - Navigation and Positioning
Fixing

Title: Mapping and Geodesy

Budget Activity: 05 - Intelligence and Communication

I. (H) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: In FY72, the Lightweight Gyro Azimuth Surveying Instrument was tested 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 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. DTIC/OTIC 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. In FY 1980, development of a Digital Topographic Elevation Data Dubbing Facility (DTEDDF) began.

2. (U) FY 1981 Program: Continue development of the Digital Elevation Data Dubbing Facility (DTEDDF). Complete operational and organization concepts for the DTEDDF.

3. (U) FY 1982 Planned Program: The DTEDDF development calls for completion of the facility in 21 months commencement of 1 May 1980. Upon completion of the DTEDDF, the facility will be turned over to an active Army engineering unit for operation.

4. (U) FY 1983 Planned Program: Begin development of Interactive Graphics Equipment for the Topographic Support System. Also begin engineering development of the Quick Response Multicolor Printer since appropriate funding has been provided in prior years to permit advanced development of the Printer to be completed in FY 1982.

5. (U) Program to Completion: This is a continuing program. Development of the Interactive Graphics Equipment and Quick Response Multicolor Printer will be completed in FY 1986. An Azimuth Determining Device and a Terrain Analysis Module will be developed in the years between FY 1984 and FY 1987.

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FY 1982 RDTB CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.78.A Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
 DDD Mission Area: #321 - Navigation and Position Fixing Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	13498	19056	21426	14206	Continuing	Not Applicable
	QUANTITIES						14
D168	NAVSTAR GPS EQUIPMENT	13498	19056	21426	14206	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 systems 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 1982 RDTB 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.

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Program Element: 46.47.7

Title: NAVSTAR Global Positioning Systems (GPS) User Equipment

DOD Mission Area: 03: Navigation and Position Fixing

Budget Activity: 05 - Intelligence and Communications

D. (U) COMPARISON WITH FY 1981 ROTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
ROTE					
Funds (current requirements)	13498	19056	21426	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	15488	19294	25340	Continuing	Not Applicable

Decrease in FY80 is due to reprogramming to higher priority Army requirements.
application of general Congressional reductions, and decrease in FY82 reflect better defined actual needs during those fiscal years.

Decrease in FY81 is the result of the

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

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Program Element: 6.47.78.A

DOD Mission Area: 7321 - Navigation and Position Fixing

Title: NAVSTAR Global Positioning Systems (GPS) User Equipment

Budget Activity: 75 - 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.

The satellites will be in 20,183-kilometer orbits. GPS will greatly enhance military capabilities for navigation and position fixing. The NAVSTAR program was approved for concept validation at USARC 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.N, NAVSTAR-GPS User Equipment. The Phase II NAVSTAR space and control segments are funded by program element 6.44.78.F, NAVSTAR-GPS Space and Control Segments. 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 (CORA/COM) at Ft Monmouth, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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

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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

fabrication of ground control systems and Joint Service airborne, vehicle, and manportable user system equipment. The Army 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. 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. The Logistics concept, including maintenance, training, and supportability, was completed. Development of test equipment for user sets maintenance was initiated.

2. (U) FY 1981 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.

3. (U) FY 1982 Planned Program: Continue with the Joint Program Office Full-Scale Development (FSD) Contract initiated in FY79. The hardware development contractors will deliver first prototypes and verify design requirements through contractor tests. Software development will continue and include Skill Performance Aids (SPA), draft publications, and necessary software for use of Automatic Test Equipment (ATE). Logistic Support concepts and training will be tested on a limited number of user equipment. Integration studies and plans will continue for vehicular and helicopter host vehicles previously identified to insure compatibility with the vehicular and aircraft sets being developed and tested by the Army. The Army will continue to monitor the development and testing of its manpack, vehicular, and aircraft sets, and insure that their user equipment will meet the requirements in Enroute Navigation, Artillery and Engineering Survey, Geodetic Mapping, Target Acquisition, Signal Intelligence, and Tactical Operations. Range Certification Test at Yuma will also be accomplished. Initiate program to integrate GPS with LDNS (Doppler) on UH-60.

4. (U) FY 1983 Planned Program: Continue with the Joint Program Office Full-Scale Development (FSD) contract initiated in FY79. The hardware development contractors will continue to support Government DT/OT tests with manpower spares and Service effort to correct noted deficiencies resulting from DT/OT testing. Software development will continue and

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include technical publication preparation, verification, and validation. Logistic support and maintainability concepts will be completed and demonstrated. Integration studies and modifications on limited models will be completed and tested to insure compatibility with the vehicular and aircraft sets being developed and tested by the Army. The Army will continue to monitor testing and completion of its manpack, vehicular, and aircraft sets, and insure that this user equipment will meet the requirements in en route navigation, artillery and engineering survey, Geodetic Mapping, Target Acquisition, Signal Intelligence and Command and Control of Tactical Operations. The Army will prepare and complete input for ASARC and DSARC production approvals and initiate and complete Request for Proposal for Phase III.

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.

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1. (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, 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, and effects of dynamics. Types of operation during testing included: precision weapon delivery, landing approach, rendezvous, photomapping, nap-of-earth, static positioning, cross-country, shipboard and combined operations. Except for reliability problems, no major deficiencies were noted.

b. During Phase II, Full-Scale Development, the following User Segment Joint Service DT&E will be conducted (with test completion dates as indicated):

(1) (U) In-plant testing will verify design of User Equipment (UE) (April 82).

(2) (U) A Vehicle mod center test (accomplished at Sikorsky on UH-60 and at Yuma Proving Ground on M-60) will verify host vehicle/UE compatibility (May 82).

(3) (U) Field DT&E will verify systems performance. Appropriate missions will be combined (DT/UT 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/UT 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; Magnivox Advanced Products Division, Torrance, CA. Test Support Contractor - Aerospace Corporation, El Segundo, CA. Joint Service Program Manager - Col J. Reynolds (USAF). Test Agencies include US Army Test and Evaluation Command (USATECOM), US Air Force Test and Evaluation Command (USAFTEC), USAOTEA, US Navy Operational Test and Evaluation Force (OPTEVFOR), and USMCOTEA.

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Program Element: #6.47.74.A

DOD Mission Area: 7121 - Navigation and Position Fixing

Title: NAVSTAR Global Positioning Systems (GPS) User Equipment
Budget Activity: 75 - 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 Sands Army 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 54 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. Government military personnel will maintain equipment during Army DT II and IOT&E.

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 883C will be conducted for a broad range of user applications.

2. (U) Operational Test and Evaluation:

a. (U) The Army is the only service that conducted operational testing during Phase I. The Phase I weight goal of 25 lbs for the manpack was not achieved in order to keep cost down, but the ultimate design goal of 10-14 lbs for the manpack is expected to be achieved. NAVSTAR Satellites 1 and 2 clocks had manufacturing defects, but satellites 3 through 6 carry improved versions of clocks and have been troublefree. (NAVSTAR 1 clock is not as accurate as desired and 2 clock is unus-

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ble. However, the four remaining satellites are more than sufficient for Army test purposes.) AD has indicated that the NAVSTAR UE will develop into a system which will meet or exceed requirements. The US Army Operational Test and Evaluation Agency (USAOTEA) judged the GPS UE suitable for continuation into the full-scale development phase. During Phase II, improvements will be accomplished.

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 independent test organization will participate in the Joint Service IOT&E by conducting operational test on service vehicles. 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) Doctrine, training, and organization
- (g) (U) Vulnerability
- (h) (U) Human factors
- (2) (U) Milestones OT II Feb-May 8)

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 infantryman.

b. (U) All test items and support equipment are expected to be available during the test period.

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Program Element: #6.47.78.A

Title: NAVSTAR Global Positioning Systems (GPS) User Equipment

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c. (U) Sets allocated for OT II from each contractor are as follows:

- (1) (U) UN60 2 sets
- (2) (U) M-60 2 sets
- (3) (U) Manpack 5 sets

d. Operational tests as described above of user equipment will be conducted prior to major production contract.

e. (U) OT I was conducted January-February 1979. No major deficiencies were noted, and the system was judged to be suitable for operational use with planned 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:

<u>Operational/Technical Characteristics</u>	<u>*Objectives</u>	<u>**Demonstrated Performance</u>
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)
MTBF	2000 hrs	****

* Phase III (Operational) Objective,

** Demonstrated during Phase I with advanced development user equipment and 4 satellite constellations.

*** Manpack not designed to fulfill weight requirement in order to save cost.

**** Size of OT RAM data sample did not permit precise analysis. However, with limited sample, manpack operational availability was 97.9%. Phase II OT will produce a Full-Scale Development RAM assessment.

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FY 1982 RDTF CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #1.28.14.A

DOD Mission Area: #125 - Other Support Programs

Title: Special Program

Budget Activity: #5 - Intelligence and Communications

THIS DESCRIPTIVE SUMMARY WILL BE SUBMITTED UNDER A SEPARATE COVER.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.11.07.A

Title: Foreign Science and Technology Center

DOD Mission Area: #312 - General Defense Intelligence Programs

Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
	TOTAL FOR PROGRAM ELEMENT	1999	58				
D381	Scientific/Technical Intelligence	1999	58			Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This is a continuing program covering exploitation, 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. This program element was 3.10.22A, Scientific and Technical Intelligence, in FY 1981 and prior submissions.

C. BASIS FOR FY 1982 RDTE REQUEST: Funding will support evaluation of foreign systems, The foreign systems will be analyzed, and evaluated to determine component and sub-system characteristics, and to the extent possible, tested operationally to determine performance and effectiveness.

D. COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands):

Program Element: #3.13.07.A

DOD Mission Area: #112 - General Defense Intelligence Programs

Title: Foreign Science and Technology Center

Budget Activity: #5 - Intelligence and Communications

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	1999	58		Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	0	62		Continuing	Not Applicable

FY 1980: The project evolves around targets of opportunity. A situation occurred whereby it was considered advantageous to reprogram funds into the project to capitalize on the of several highly critical threat systems.

FY 1981: The funding level difference is attributable to minor budgetary adjustments.

FY 1982: Funding to support anticipated targets of opportunity.

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

Program Element: 03.13.07.A

Title: Foreign Science and Technology Center

DOD Mission Area: D312 - General Defense Intelligence Programs

Budget Activity: 05 - 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. There is no unnecessary duplication of effort among services and agencies.

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 1980 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 foreign threat weapons systems were evaluated in detail, and tested operationally in support to US development programs. There were threat systems evaluated

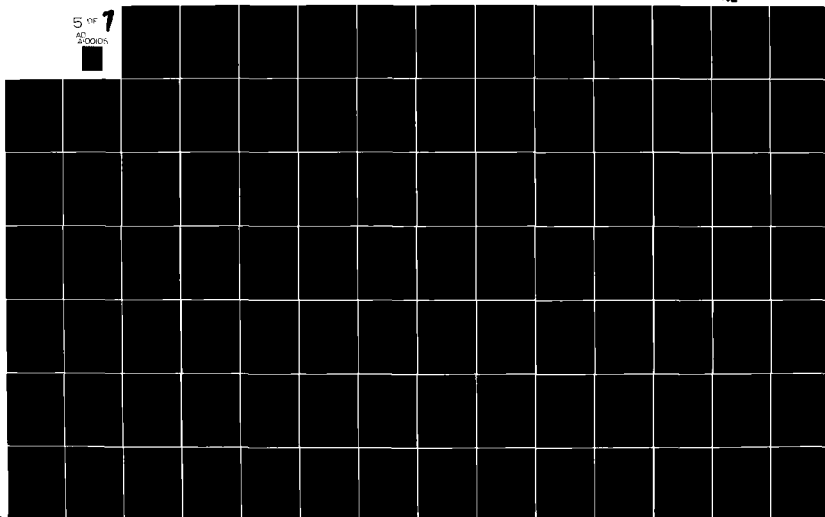
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Program Element: #1.13.07.A
DOD Mission Area: #112 - General Defense Intelligence Programs

Title: Foreign Science and Technology Center
Budget Activity: #5 - Intelligence and Communications

In FY 1980. Additionally, during FY79 and FY80:

2. FY 1981 Program: evaluation, and exploitation of foreign threat systems will continue based on availability of systems and funds. Additionally, the following items are planned for evaluation:

3. FY 1982 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 two foreign threat systems for exploitation. Targets of opportunity will be considered as the occasion arises. Additionally, the following items are planned for exploitation:

Program Element: #3.13.07.A

Title: Foreign Science and Technology Center

DOD Mission Area: #312 - General Defense Intelligence Programs

Budget Activity: #5 - Intelligence and Communications

4. (U) FY 1983 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.

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FY 1981 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.31.11.A Title: Strategic Communications (STARCOM)
 DOD Mission Area: #322 - Support and Base Communication Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
TOTAL FOR PROGRAM ELEMENT QUANTITIES		561	645	804	834	Continuing	Not Applicable
D481	Strategic Communications (STARCOM)	561	645	804	834	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Army base communications are required to handle rapidly increasing quantities of information intra-base, and to provide interfaces to an increasingly sophisticated and heavily used Defense Communications System (DCS) and to tactical communications systems. Efficient and effective base communications are essential to effective command, control, and administration of the Army before and during mobilization. However, existing base communications systems cannot support the requirements placed upon them in an efficient and cost-effective way, thus there is a need to update the existing systems and equipments. This program provides developmental efforts for nontactical telecommunications networks, services, facility controls, and interfaces to improve the effectiveness of Army base communications. It also addresses the need for responsive communications and interoperability at Echelons above Corps (EAC). This program will develop concepts and prototype equipment to maintain and improve Army base communications in a timely and cost-effective manner.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Principal efforts will be directed towards monitoring contracts for investigation of Echelons Above Corps Interface/Interoperability; for investigation of concepts for Emergency High-Frequency (HF) Radio and for development of Interconnect Fiber Optics.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

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Program Element: #3.31.11.A Title: Strategic Communications (STARCOM)
 DOD Mission Area: #322 - Support and Base Communication Budget Activity: #5 - Intelligence and Communications

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	561	645	804	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	500	693	784	Continuing	Not Applicable

Decrease in FY 1980 was due to internal reprogramming to support interconnect fiber optics. Increase in FY 1982 is due to inflation. The decrease in FY 1981 was due to the application of general Congressional reductions.

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

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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 and in transportable configurations for Echelons Above Corps communications. These equipments and systems are necessary for needed modernization of Army base communications worldwide. Modernization will replace existing equipment and systems with digital equipment that will significantly improve traffic-handling speed and capacity, with increased reliability and decreased operations and maintenance costs. These systems will interoperate with a wide variety of civilian systems. Maximum use is made of commercially developed equipment and technology to determine its capability to satisfy Army needs with development efforts to satisfy those Army-unique requirements which cannot be satisfied by commercial equipment. Specific tasks include Echelons Above Corps Interface/Interoperability, Emergency HF Radio and Interconnect Fiber Optics. Future tasks in this program element will support STARCOM requirements for Communications Endurance under Stress (Survivability). The provision of more survivable, interoperable communications will improve the ability to provide credible response to a wide range of contingencies in support of U.S. national objectives.

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 Sciences, Boulder, CO; National Bureau of Standards, Boulder, CO.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Completed evaluation of brassboard Electromagnetic Radiation (EMR) Hazards Monitoring System and terminated development effort. Initiated investigation of Echelons Above Corps (EAC) Interface/Interoperability issues. Monitored contract for investigation of Interconnect Fiber Optics concepts.

2. (U) FY 1981 Program: Continue investigation of Echelons Above Corps Interface/Interoperability issues and monitor contract for definition of EAC interfaces. Analyze current government and private sector Research and Development (R&D) efforts for applicability to Emergency HF Radio development. Analyze contractual efforts to determine areas for Interconnect Fiber Optic development.

3. (U) FY 1982 Planned Program: Complete contract for definition of EAC interfaces. Analyze and prioritize problems and initiate development of cost-effective solutions to EAC interoperability problems. Initiate contract for definition of Emergency HF Radio. Monitor contract for the development of Interconnect Fiber Optic system.

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Program Element: #3.31.11.A Title: Strategic Communications (STARCOM)
DOD Mission Area: #322 - Support and Base Communication Budget Activity: #5 - Intelligence and Communications

4. (U) FY 1983 Planned Program: Monitor contract for ADMs of Echelons Above Corps Interface devices/applique units. Continue monitoring contract for Emergency HF Radio. Continue monitoring contract for Interconnect Fiber Optic System.

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

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FY 1992 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	1977	7565	7667	6923	Continuing	Not Applicable
0149	Army Support for DCS (Defense Communication Systems)	1977	7565	7667	6923	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports development efforts to sustain and improve vital command, control, and administrative communications in areas of the Defense Communications System (DCS) for which the Army is responsible. Increased demands are placed upon the DCS by enhanced force deployability and mobility and by increasing volume and sophistication of traffic. These demands cannot be satisfied by the existing DCS equipment and technology, and thus a need exists to develop and install modern switching and transmission equipment which is more capable, more efficient, and more reliable than existing, older technology equipment. To enable prompt worldwide force deployability and command capability, this equipment must interoperate with NATO and civilian agencies to provide commanders at all levels with credible responsiveness over a wide range of contingencies in support of US national objectives. This program will develop the equipment and concepts and provide prototype equipment needed by the Army to satisfy these requirements.

C. (U) BASIS FOR FY 1992 RDTE REQUEST: Complete concept definition of the Access Area Digital Switching Structure (AADSS) and prepare to award a development contract to validate AADSS concepts. Continue contractual efforts for Product Improvement of the Digital Radio and Multiplex Acquisition (DRAMA) equipment. Award contract for development of modular DCS facilities.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

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Program Element: 3.31.26.A

Title: Long Haul Communications (DCS)

DOD Mission Area: 3.3 - Common User Communications

Budget Activity: 5 - Intelligence and Communications

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	1977	7565	7667	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	2580	8769	9999	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 decrease in FY81 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

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Program Element: #3.31.26.A
DOD Mission Area: #323 - Common User Communications

Title: Long Haul Communications (DCS)
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 Defense Communications Agency and which are assigned to the Army for implementation. The equipment and systems are for worldwide deployment in fixed and recoverable military base environments. Maximum use is made of commercially developed equipment and technology to determine its capability to satisfy DCS needs, with development efforts to satisfy those unique requirements which cannot be satisfied by commercial equipment. To effectively support forces already deployed and future short planning period force deployments, these systems and equipment must be capable of interoperating with NATO systems and a variety of civilian systems to provide worldwide connectivity capability with minimal cost and delay. Specific development areas include the Access Area Digital Switching System (AADSS), DRAMA Radio and Multiplexer, and standardization of DCS facility design.

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 Sciences, Boulder, CO, and industrial contractors.

I. (U) PROGRAM ACCOMPLISHMENT AND FUTURE PROGRAMS

1. (U) FY 1980 and Prior Accomplishments: Completed development of Adaptive Antenna Control (AAC) and Efficient Reliable High Power Amplifier (ERHPA) Klystron tube. Awarded contract for modification of MD-918 ()/GRC Digital Troposcatter Modems for the digitization of the Berlin troposcatter transmission link.

2. (U) FY 1981 Program: Monitor contracts for concept development of Access Area Digital Switching Structure. Monitor development contracts for Product Improvement Modules for DRAMA line-of-sight (LOS) radio and multiplexer. Monitor contract for modification of MD-918 Digital Troposcatter Modems. Monitor contract for definition of modular DCS facilities requirements. The increase in FY81 was to provide funds to add additional transportability requirements for Digital European Backbone restoral to the Product Improvement on the Digital Radio and Multiplex Acquisition (DRAMA) equipment. The decrease in FY80 was due to reprogramming of funds to higher priority projects. The decrease in FY82 is due to Department of Defense-imposed RDTE fund cuts and to reprogramming into higher priority projects.

3. (U) FY 1982 Planned Program: Complete concept definition contracts for AADSS and prepare Statement of Work for Concept validation contract. Continue monitoring development contracts for Product Improvement modules for DRAMA LOS Radio and Multiplexer. Award development contract for DCS modular facilities.

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Program Element: #1.31.26.A

DOD Mission Area: #323 - Common User Communications

Title: Long Haul Communications (DCS)

Budget Activity: #5 - Intelligence and Communications

4. (U) FY 1983 Planned Program: Monitor AADSS concept validation contract and initiate installation of prototype test-bed. Complete development contracts for Product Improvement Modules for LOS Radio and Multiplexer and initiate testing of modules. Complete monitoring of contract for prototype DCS modular facilities. Complete investigations of channel enhancement techniques and multiplexer concentrator and multiplexer control and reconfiguration concepts and develop a preferred unified approach to future DCS multiplexers.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #3.34.01.A

Title: Communications Security (COMSEC) Equipment

DOD Mission Area: #324-Communications Security

Budget Activity: #5 - Intelligence and Communications

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
	TOTAL FOR PROGRAM ELEMENT						
	QUANTITIES						
D491	Communications Security					Continuing	Not Applicable
	Equipment Technology						
D901	Signal Security Activities		0	0	0	0	3349

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Enemy and friendly forces are constantly improving their signals intelligence capabilities. Improvements are both in the signal analysis and direction-finding areas. On the modern battlefield success will depend on the ability to gain intelligence on the enemy and deny intelligence to the enemy. It is becoming important not only to deny the enemy the information contained in our signals,

The development/testing community must be aggressive in countering foreign intelligence collection. The Army COMSEC program is principally designed to develop COMSEC techniques and equipment to deny valuable tactical intelligence to enemy forces. Inherent efforts in this program are to improve the weight, size, and capability of tactical secure devices and to design them to handle the increasingly high data rates. Various COMSEC telephone and radio devices with their accompanying subsystems are being planned and designed to interoperate with each other and with our allies, to provide total protection on the battlefield. Army programs are coordinated with NSA to insure no duplication with other service efforts.

Program Element: #3.34.01.A
DOD Mission Area: #124-Communications Security

Title: Communications Security (COMSEC) Equipment
Budget Activity: #5 - Intelligence and Communications

C. BASIS FOR FY 1982 RDTE REQUEST: Continue TEMPEST and COMSEC systems support to Army developers. Continue installation kit development for fielding security devices. Continue development of secure terminals for Special Forces to provide and the TEMPEST Automated Data Acquisition and Analysis System (TADAAS). Continue hardware development of, and Multiple User Storage Equipment (MUSE). Evaluate data security device exploratory models and prepare specifications for advanced development models. Expand systems engineering efforts towards COMSEC interoperability of new equipment/systems entering the Army inventory.

D. COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)				Continuing	Not Applicable
Funds (as shown in FY 1981 submission)				Continuing	Not Applicable

The decrease in FY 1982 from the previous request was caused by the need to move funds to higher priority Army programs. Reduction will result in an extension of the TADAAS development program, reduction in systems engineering support to Army developers, and moving Multiple User Storage Equipment equipment delivery to FY83. Increase in FY80 was due to reprogramming and decrease in FY81 is attributable to general Congressional reductions.

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: This continuing Army COMSEC RDTE program supports Army, and upon the request of the National Security Agency (NSA), joint COMSEC requirements. Primary exploratory efforts include continuing studies of voice and data security techniques required to satisfy present and future Army requirements. Assist the production efforts for the Communications Mode Selector Control (CMSC), which

Perform

technical evaluation of the AN/FGA-21 Terminal for use by the Special Forces.
and improved transmission security techniques. Complete advanced development model of the Handheld Device for and electronic Army Communications Electronic Operating Instructions (CEOI) capability (HEAD), and award advanced development contract for the Multiple User Storage Equipment (MUSE) for

G. (U) RELATED ACTIVITIES: All COMSEC RDTE within DOD is a responsibility of the NSA under DOD Directive C-5200.5. This effort represents those COMSEC developments delegated to the Army by NSA. Program Element 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, Single Channel Ground and Airborne Radio System, 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; Booz Allen, Tinton Falls, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: Continued efforts in the areas of COMSEC systems engineering support and TEMPEST design support test and evaluation. Completed engineering development and started service testing of the Communications Mode Selector Control (CMSC), which adapts the

Completed development and service testing of the Secure Wireline Access Terminal

(SWAT)
Terminals for Special Forces, Continued development of Secure and a Multiple User Storage Equipment (MUSE). Continued development of installation kits required for integration of COMSEC equipment into the Army inventory and the Data Security Device. Techniques were developed for automated TEMPEST compromising emissions testing intended to drastically reduce the high cost and time required to assure compliance with Army TEMPEST requirements.

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 1981 Program: Award production contract for the Communications Mode Selector Control (CMSC) and Complete exploratory development models at the Data Security Device and Multiple User Storage Equipment (MUSE).
Continue Development of TEMPEST Automated Data Acquisition and Analysis System (TADAAS) hardware. Continue to provide Communication Security (COMSEC) and TEMPEST design guidance and support to Army system developers. Obtain delegation to continue Handheld Encryption and Authentication Device (HEAD) program into engineering development for the National Security Agency.
3. FY 1982 Planned Program: Continue to provide TEMPEST and COMSEC advice/assistance to Army developers. Continue development of secure terminals for special forces, TADAAS the Multiple User Storage Equipment (MUSE) and the Increase the capability to perform systems engineering studies specifically designed to support program managers with security applications which insure COMSEC interoperability for new equipment/systems being introduced into the Army inventory. Evaluate exploratory models of data security device and prepare specifications for advanced development models.
4. FY 1983 Planned Program: Initiate contract for and equipment for a COMSEC monitor. Complete AD models of MUSE. Start contract for Engineering Development models of HEAD. Provide necessary technical support for fielding of CMSC and SWAT. Provide systems engineering support, COMSEC and TEMPEST advice and assistance to Army developers.
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 1982 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)

<u>Project Number</u>	<u>Title</u>	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion Continuing</u>	<u>Total Estimated Costs Not Applicable</u>
	TOTAL FOR PROGRAM ELEMENT	17880	21556				
D190	Electronic Warfare Signatures, Fuzes, and Special Electromagnetic Interference	0	0			Continuing	Not Applicable
D234	Interdiction, Suppression, and Counterfire Weapons Vulnerability/Susceptibility	0	0			Continuing	Not Applicable
D267	Air Defense Weapon System Vulnerability/Susceptibility	13789	17735			Continuing	Not Applicable
D626	Communications-Electronics Vulnerability/Susceptibility	4091	3821			Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Since an enemy's use of electronic warfare (EW) could greatly reduce the effectiveness of US Army electronic/electro-optical dependent systems, the objectives of this program are to: determine the susceptibility to EW of US Army missile and communications electronic systems; determine the EW vulnerability of enemy missiles representing a threat to the tactical commander; develop prototype EW systems to exploit the electronic countermeasures (ECM) vulnerability of enemy electronic systems; and provide to US Army developers recommendations on electronic counter-countermeasures (ECCM) circuits and devices for missile, communications-electronic (CE), and night vision/electro-optical (NV/EO) systems that will reduce the vulnerability of US systems to enemy EW operations.

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

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Funds are required to continue testing US systems against EW. Advanced threat simulating test instrumentation will be obtained to permit continued testing of the enhanced Patriot, Stinger-POST, Improved Chaparral, Improved Hawk, DIVADS, and US Roland systems. Vulnerability/susceptibility studies and simulations will be performed using the advanced concepts and threat levels required to direct test requirements and verify test results. ECM measurement systems will be upgraded to permit accurate collection of data. EW field tests will be conducted on all air defense (AD) weapons systems to validate ECCM effectiveness prior to the production or fielding of product improvements. New starts will be made in the electronic warfare (EW) analysis of antistandoff jammer, directed energy, battlefield surveillance radars and new generation Identify Friend or Foe (IFF) systems. Special Electromagnetic Interference (SEMI) work will continue to include missile measurements and jammer development. Development and fabrication of EW testbed instrumentation for field evaluation of the Standoff Target Acquisition System (SOTAS), Single-Channel Ground Airborne Radio System (SINGARS), Position Location Reporting System/Joint Tactical Information Distribution System (PLRS/JTIDS) Hybrid, and other communications electronics (C-E) systems will continue. Programs to assess the EW vulnerability of C-E and night vision/electro-optical (NV/EO) systems will continue. Tri-Service exploitation and EW investigations of foreign missile systems will continue.

D. COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Total Funds (current requirements)	17330	21556		Continuing	Not Applicable
Total Funds (as shown in FY81 submission)	19407	22638		Continuing	Not Applicable

Decrease in FY 1980 is due to reprogramming to meet high-priority Army requirements. Decrease in FY 1981 and FY 1982 is due to budgetary constraints not anticipated in the FY 1981 submission.

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Program Element: #6.37.19.A

Title: Electronic Warfare Vulnerability/Susceptibility

DOD Mission Area: #454 - Other Test and Evaluation Support

Budget Activity: #6 - Defensewide Mission Support

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

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Program Element: 6.37.18.A

Title: Electronic Warfare Vulnerability/Susceptibility

DOD Mission Area: 454 - Other Test and Evaluation Support

Budget Activity: 16 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTIONS: All electronic/electro-optical dependent systems are to some degree susceptible to electronic warfare (EW). All such US Army systems must be analyzed so that their susceptibilities are determined and counter-countermeasures (CCM) are developed to assure their effectiveness in a hostile EW environment. Hostile threat systems must also be analyzed in order that their EW susceptibilities may be exploited by the United States. This program provides for EW susceptibility investigations of the missile systems, night visions systems, electro-optical (EO) systems, other electronic dependent systems, and electronic CCM and EO CCM technology of the US Army as well as foreign missile systems. Recommendations designed to eliminate or reduce the susceptibility of Army systems, including proposed hardware, software, and operating procedures changes, are provided to system developers. The susceptibilities detected in foreign threat systems are provided to appropriate intelligence and electronic countermeasures (ECM) system development activities for exploitation.

G. (U) RELATED ACTIVITIES: The work performed under this Program Element 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, New Jersey; Signals Warfare Laboratory, Vint Hill Farms, VA; Night Vision & Electro-Optical Laboratory, Ft 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 Research and Development Command (CORADCOM). Other related research and studies are performed by the Air Force in Program Elements (PE) 6.37.50.F, Countermeasures Advanced Development; 6.37.18.F, Electronic Warfare Technology; 6.37.43.F, Electro-Optic Warfare. Navy work is done in PE's 6.37.96.N, Airborne Electromagnetic and Optical Systems; 6.37.97.N, Surface Electromagnetic and Optical Systems; 2.45.73.N, Navy Cover and Deception Programs. Coordination is accomplished by exchange of technical reports, attendance at scientific meetings and conferences, joint development projects, and reviews conducted by the Office of the Secretary of Defense (Under Secretary of Defense for Research and Engineering). A joint Army, Navy, Air Force, and Marine Corps project for EO guided weapons CM testing is being conducted under a program funded by the Under Secretary of Defense for Research and Engineering. 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 communications-electronics vulnerability/electronic CM analyses are conducted by the Electronic Warfare Laboratory, ERADCOM, Ft Monmouth, NJ. Major contractor support is provided by GTE Sylvania, Mountain View, CA; New Mexico State University, Las Cruces, NM; General

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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

Dynamics Corp., Ft Worth, TX; Sanders Associates, Nashua, NH; Stanford Research Institute, Menlo Park, CA; American Electronics, Laboratory, Lansdale, PA; Hughes Aircraft Co, Culver City, CA; Kentron International, Inc., Ft Worth, TX; Hycor, Woburn, MA; Vought Engineering Labs., Dallas, TX; Atlantic Research Corp., Alexandria, VA; and RCA, Cherry Hill, NJ.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: Electronic countermeasure (ECM) vulnerability studies were conducted on Safeguard, Pershing, Lance, Nike-Hercules, Shillelagh, Dragon, TOW, Hellfire, Copperhead, Improved Hawk, Redeye, Stinger, Chapparral, US Roland, Patriot, DIVADS, and other Army missile systems and missile radar fuzes. Closed-loop simulations for REDEYE and Stinger in EW environment have been performed. The test planning and field operations for the EW portion of the Development Tests/Operational Tests II for Patriot have been completed, and the vulnerability analysis published. US Roland product confirmatory tests have been initiated; two advanced threat jammers have been procured to support these tests. Design analysis resulting in revision of Stinger-POST software logic has been completed and reports on the deployment and tactics for Stinger-POST published. Vulnerability investigation of several Improved Hawk product improvements has been completed, and Improved Hawk studies and test planning for the Improved Perimeter Acquisition Radar Emission Control, Improved Hawk Missile ECCM upgrade and the Improved high power illumination RAM product improvement programs have been initiated. EW investigations have been initiated on the Sense-and-Destroy Armor (SADARN), Smart Target Activated Fire-and-Forget (STAFF) system, Infantry Manportable Assault Antiarmor Weapon System (IMAAWS), Tank Breaker, Advanced Indirect Fire System (AIFS), Assault Breaker, and terminally guided warheads for the Multiple Launch Rocket System (MLRS). A preliminary theoretical EW susceptibility investigation was completed on the Target Acquisition and Designation System/Pilot Night Vision Sight (TADS/PNVS).

In the area of counter-countermeasures (CCM) 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. EW vulnerability analyses of Pershing and Patriot missile systems communications were completed. EW vulnerability analyses were completed and ECCM recommendations furnished for Firefinder radars (AN/TPQ-36, AN/TPQ-37), SOTAS, Sidelooking Radar (AN/APS-94F) and modular integrated communications navigation systems (MICNS).

2. FY 1981 Program: The EW design efforts for the Patriot ECCM Enhancement Program will be initiated with development of advanced threat test instrumentation and fabrication of field test measurement systems. The Patriot tests to

Program Element: #6.37.19.A

DOD Mission Area: #454 - Other Test and Evaluation Support

Title: Electronic Warfare Vulnerability/Susceptibility

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be supported include software confirmation, battalion triangulation, antiradiation missile decoy, and interface with early warning aircraft (E3A) tests. The Stinger-POST planned firings will be conducted against the advanced infrared/ultraviolet (IR/UV) threats, and closed-loop simulations will be completed on the preproduction Stinger-POST. Field tests to verify vulnerability assessment of the AN/DAW-1 version of Chaparral will be conducted, and assessment of laser CM hardening will be tested in open-loop simulation. The Roland system work will provide a comparison of the field test data and semiphsical simulations to determine effectiveness of ECCM fixes. The planning, coordination, and conduct of DIVADS follow-on evaluation (FOE) will be accomplished. Live firing tests of TOW II missiles against a target equipped with ECM devices will be conducted. Theoretical, laboratory, and field investigations will be conducted to establish susceptibility levels of the Sense-and-Destroy Armor (SADARM) and Tank Breaker advanced development missile seekers. Theoretical analysis of the laser beamrider Infantry Manportable Assault Antiair (IMAAWS) will continue.

Tri-Service leadership of these systems will continue. Advanced active and passive ECM techniques investigations of Hellfire and Copperhead will be conducted for improvement verification of ECCM designs. Laboratory ECM investigations including optical signature measurements will be conducted on the Target Acquisition and Designation System/Pilot Night Vision System (TADS/PNVS). A review of the Assault Breaker (AB) target acquisition and seeker/sensor designs will be completed and a study initiated to identify potential ECM techniques and susceptibilities of Assault Breaker (AB) and terminally guided warheads (TGW) for the Multiple Launch Rocket System (MLRS). Analysis of imaging/millimeter seekers for the Advanced Indirect Fire System (AIFS) will continue. and efforts on other electronic devices/systems will be initiated. Vulnerability investigations of SINGARS, PLRS/JTIDS Hybrid, Standoff Target Acquisition System (SOTAS) and communications systems for Patriot and electronic warfare (EW) systems will be continued. EW vulnerability analyses and field testing of various night vision and electro-optical (NV/EO) systems will continue. EW field tests of the counter mortar/counterbattery radar systems production units will be conducted. Development of the first station of the Mobile EW Environment Simulator (MEWES) for radar/data link testing and threat instrumentation for SINGARS and PLRS will be completed.

3. FY 1982 Planned Program: Continue the Patriot Enhancement Program with emphasis on ECCM software capabilities and the effects of low cross-section targets, improved guidance, multifunction capabilities and radar ECM control functions using advanced threat-level responsive coherent deception techniques. Simulations on the production configuration of Stinger-POST will be completed to verify ECCM capabilities. Upon delivery of the Advanced Chaparral EO CM device, flyby and tracking missions will be conducted to establish advanced threat trends for vulnerability analysis of electro-optical air defense systems. The Roland confirmatory tests will be conducted to validate ECCM production fixes. Advanced ECM/EOCM

Program Element: #6.37.18.A

Title: Electronic Warfare Vulnerability/Susceptibility

DDO Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

testing of the DIVADS Gun System will be conducted during initial production tests using threat-level EW test jammers to formulate EW vulnerability conclusion for the DIVAD Gun System. Laboratory susceptibility tests will be conducted on the latest Copperhead ECCM modified production model seeker and live firing ECM tests will be conducted and a final vulnerability assessment made. Studies and laboratory susceptibility investigations will be conducted to evaluate the effects of ECM on Hellfire infrared imaging fire-and-forget seeker designs. ECM lab/field investigations will be performed on Tank Breaker, STAFF, and IMAAWS candidate systems to evaluate system concepts and performance under specified EW environments. A final vulnerability assessment of TOM II will be completed following laboratory/field ECM tests of the final design. Technological threat and countermeasures studies of the Assault Breaker engineering development seeker designs and target acquisition radar will be completed. A susceptibility/vulnerability assessment of terminally guided warheads for the Multiple Launch Rocket System (MLRS) will be provided the Program Manager (PM).

Tri-Service efforts in ECM exploitation will continue.

of the development tests and the SEMI tests will both be performed on the. The electronic warfare (EW) portion A SEMI jammer concept will be designed and a brassboard initiated. Signature measurements will continue to be provided in support of EW vulnerability analyses with emphasis on Stinger-POST, Chaparral Rosette, and SADARM. Patriot chaff vulnerability assessment and US Roland fuze EW evaluation will be completed. Test and analysis support will be provided for SINGARS EW field tests. Development of VHF emitter location capability to be added to the Communications EW Simulator (COMES) will be started. Development of instrumentation (MEWES) to evaluate ECCM performance of intelligence, surveillance, target acquisition (SFA) radars (SOTAS, ARS-94, Q-36, Q-37, etc.) will continue. EW vulnerability/ECCM analyses of PLRS/NTIDS Hybrid (PJH) and data links for EW systems will be completed.

4. FY 1981 Planned Program: The final phase of Pershing II (PII) ECM captive flight tests will be completed and preparation for live ECM firing tests will be finalized and tests conducted. Laboratory/field ECM investigations plus missile flight simulations will be performed on the IMAAWS engineering development model to assess its performance under various EW environments. Analysis and laboratory/field tests of competing Advanced Indirect Fire Systems (AIFS) for cannon artillery weapons and the Sense-and-Destroy Armor (SADARM) advanced development seeker will continue.

Tri-Service efforts in ECM exploitation will continue. Stinger-POST live firing missions will be conducted to evaluate CCM improvement in production design. The vulnerability investigation of advanced imaging seekers will be initiated. Advanced ECM/ECCM investigation of testing of the Improved Chaparral will be performed and EW vulnerability

Program Element: #6.37.18.A

Title: Electronic Warfare Vulnerability/Susceptibility

DOD Mission Area: #654 - Other Test and Evaluation Support

Budget Activity: #6 - Defensewide Mission Support

conclusions drawn. Roland confirmatory tests will be conducted to establish this systems response to projected threats. The prototype DIVAD Gun System will be tested against the increased power capability of advanced threats. Artillery and missile fuze evaluations will continue. Complete VNF emitter location capability for COMEWS and evaluate SINGARS-V vulnerability to position fixing by hostile electronic warfare support measures (ESM). Begin EW vulnerability analysis of All Source Analysis System/SIGNIT EW System (ASAS/SEWS). Start development of Emitter Location Vulnerability Evaluation System (ELVES) to field test emitter location vulnerability of ISTA radars. Complete tests and evaluation of second-generation FLIR hardware and recommend appropriate optical counter-countermeasures hardening.

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

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D234 Title: Interdiction, Suppression, & Counterfire Weapons Vulnerability/Susceptibility
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DOD Mission Area: #454 - Other Test Budget Activity: #6 - Defensewide Mission Support
and Evaluation Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: All electronic dependent missile systems are susceptible (receptive), to some degree, to electronic warfare (EW). The degree of susceptibility coupled with an assessment of the threat, economics, technical and tactical feasibility of implementing a particular electronic countermeasures (ECM) technique provides a measure of whether a system is vulnerable to ECM. All US Army interdiction, suppression, and counterfire weapon systems must be analyzed and systematically subjected to laboratory and field investigations to establish levels of susceptibility to ECM so that electronic counter-countermeasures (ECCM) techniques may be developed. Implementation of effective ECCM techniques in the systems will reduce or eliminate their vulnerability to ECM, thus assuring a high level of system effectiveness in a hostile electronic warfare (EW) environment. Foreign missile systems must also be analyzed in order that their EW susceptibilities may be exploited by the US. The objectives of this project are to:

1. (U) Determine the susceptibilities to ECM of US Army interdiction, suppression, and counterfire weapon systems.
2. (U) Develop state-of-the-art prototype ECM techniques and devices to evaluate the effects of near-term (1-5 years) and far-term (5-10 years) threats to our systems.
3. (U) Develop and recommend technical and tactical counter-countermeasure recommendations to US system developers and users to reduce or eliminate vulnerabilities of our systems to enemy ECM.
4. (U) Determine the susceptibility/vulnerability for selected foreign missile systems which are a threat to the US.
5. (U) Develop prototype ECM techniques and devices to exploit the EW vulnerability of foreign missile systems.

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, particularly at the project engineer level. Other related research and studies are performed by the Air Force in Program Element (P.E.) 6.37.50.P, Counter-Countermeasures Advanced Development; 6.37.18.P, Electronic Warfare Technology; 6.37.43.P, Electro-Optic Warfare. Navy work is found in PE's 6.37.96.N, Airborne Electromagnetic and Optical Systems; 6.37.97.N, Surface Electromagnetic and Optical Systems; 2.45.73.N, Navy Cover and Deception Programs.

Project: #D234 Title: Interdiction, Suppression, & Counterfire Weapons Vulnerability/Susceptibility
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DOD Mission Area: #454 - Other Test Budget Activity: #6 - Defensewide Mission Support
and Evaluation Support

C. (U) WORK PERFORMED BY: In-house research, development, exploitation, and missile system susceptibility/vulnerability analyses are conducted by the Office of Missile Electronic Warfare (OMEW), a subordinate element of the US Army Electronics Research and Development Command (ERADCOM) at White Sands Missile Range (WSMR), NM. Major contractor support is provided by: QAO Corp., Beltsville, MD; NMSU University, University Park, NM; Applied Dynamics, Ann Arbor, MI; RCA, Cherry Hill, NJ; Vought Corp., Dallas, TX; Sanders Associates, Nashua, NJ; IIT Research Institute, Chicago, IL. Contractors will perform on approximately 15 contracts with a total dollar value of \$1,794,000 for the project.

D. (U) PROGRAM ACCOMPLISHMENT AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: This is a new project in FY82. The following work was actually performed in PE 6.37.18.A/D267. Electronic countermeasures (ECM) susceptibility/vulnerability investigations have been conducted on Lance, Pershing, Shillelagh, Dragon, TOW, HELLFIRE, and Copperhead. Preliminary electronic warfare investigations have also been conducted on improved versions of above-named systems, namely Pershing II, TOW II, and fire-and-forget HELLFIRE. Plans, theoretical and laboratory investigations have been completed, and studies initiated on new missile systems currently under early stages of development. These missile systems include SADARM, STAFF, IMAAWS, Tank Breaker, AIF's, Assault Breaker, and terminally guided warheads for MLRS. Theoretical, laboratory, and field investigations have been performed on the Pershing II engineering development design. Several electronic counter-countermeasure (ECCM) recommendations have been made, accepted, and implemented by the developer. Specifications were prepared for field testing of Pershing II under full-scale threat conditions. Joint Army/Air Force tests were conducted which demonstrated the effectiveness of a ground-based ECM prototype system against aircraft radars (attack, terrain-following, terrain-avoidance) and the feasibility of passive tracking. Advanced Development hardware is being pursued under another project, PE #6.37.55 DK12. Since initial development, numerous theoretical and laboratory ECM investigations have been completed on the evolving designs of the HELLFIRE and COPPERHEAD laser missile systems. Several ECCM recommendations have been made, accepted, and incorporated into the systems. Missile flight simulations and combat simulations have been conducted to identify critical missile susceptibilities under EW, smoke and aerosol conditions and evaluate proposed ECCM. Findings from these investigations have been used by other government organizations as key inputs to several studies including the Military Implications of Lasers Employed by the Soviets (MILES) Study. A preliminary theoretical EW susceptibility investigation and report was completed on the Target Acquisition and Designation System/Pilot Night Vision Sight (TADS/PNVS). Test plans were developed and instrumentation modifications and developments initiated for laboratory EW investigations of the TADS/PNVS. ECM analysis and field tests on a preliminary design of the Sense and Destroy Armor (SADARM) system have been performed and reported. A susceptibility analysis report was published on the Smart Target Activated Fire and Forget (STAFF) system.

Project: #D234 Title: Interdiction, Suppression, & Counterfire Weapons Vulnerability/Susceptibility
 Program Element: #6.37.18.4 Title: Electronic Warfare Vulnerability/Susceptibility
 DOD Mission Area: #454 - Other Test Budget Activity: #6 - Defensewide Mission Support
 and Evaluation Support

Results have been reported and/or considered/incorporated in ECM equipment under development by the of Army. Analysis of the susceptibility of the Assault Breaker (AB) Pave Mover radar was initiated and plans developed and coordinated with Army and Air Force for EW field tests during the technology demonstration phase in FY 81. Analysis was initiated of proposed infrared/millimeter seekers for the Advanced Indirect Fire System (AIFS), terminally guided warheads for the Multiple Launch Rocket System (MLRS), Tank Breaker, and Infantry Manportable Assault Antiair Weapon System (IMAAWS). EW techniques and devices were developed for ECM investigations and live firing tests of the TOW II system. Contracts were awarded for test instrumentation developments of electro-optical devices, lasers, and a dynamic infrared background system for dynamic closed-loop laboratory EW investigations of infrared imaging missile systems currently under advanced and engineering development.

2. FY 1981 Program: This is a new project starting in FY82; the following work was performed in PE 6.37.18.A/D267. ECM investigations of the Pershing II engineering development (ED) design will continue. Modifications of test instrumentation will be completed and preparations made for ECM tests. Captive ECM flight tests will be conducted and data analysis performed to develop a statistical error model for development of a missile terminal performance prediction technique. Live firing tests of TOW II missiles against a target equipped with ECM devices will be conducted. Test data will be analyzed and a report published. ECCM recommendations will be made to the project manager's office (PMO) to assist in hardening the TOW II missile-tracking system design against potential ECM action by the enemy. Theoretical, laboratory, and field investigations will be conducted to establish susceptibility levels of the Sense and Destroy Armor (SADARM) and Tank Breaker advanced development missile seekers. Theoretical analysis of the laser beamrider Infantry Manportable Assault Antiair Weapon System (IMAAWS) will continue and a report published.

Portions of this hardware will require fabrication for use on the ECM simulator. Tri-Service leadership on these systems will continue. Laboratory tests, missile flight simulations, and combat simulations will be conducted of the latest engineering development model of the laser HELLFIRE missile and COPPERHEAD production design seeker. Advanced active and passive ECM technique investigations of HELLFIRE and COPPERHEAD will be conducted for improvement verification of ECCM designs. Investigations and analysis of the infrared imaging HELLFIRE seeker will be initiated. Application of threat methodology to long-term ECM/ECCM predictions will continue. Laboratory ECM investigations including optical signature measurements will be conducted on the Target Acquisition and Designation System/Pilot Night Vision System (TADS/PNVS). A susceptibility/vulnerability assessment will be made and a report provided the project manager for ASARC/DSARC deliberations. Electronic support measure tests will be performed on the Pave Mover Low probability of Intercept radar as part of the Assault Breaker (AB) end-game technology demonstration phase. A review of the AB target acquisition and seeker/sensor designs will be completed and a study initiated to identify potential

Project: #D234 Title: Interdiction, Suppression, & Counterfire Weapons Vulnerability/Susceptibility
Program Element: #6.37.18.A Title: Electronic Warfare Vulnerability/Susceptibility
DOD Mission Area: #454 - Other Test Budget Activity: #6 - Defensewide Mission Support
and Evaluation Support

ECM techniques and susceptibilities of AB and terminally guided warheads (TGW) for the Multiple Launch Rocket System (MLRS). Analysis of Infrared Imaging/millimeter seekers for the Advanced Indirect Fire System (AIFS) will continue and support provided the PM in the area of EW.

3. FY 1982 Planned Program: A terminal performance study and development of a computer simulation model of assessing Pershing II (PII) missile terminal performance will be completed. Modifications and upgrade of ECM equipment and instrumentation will be completed. Extensive ECM captive flight tests will be conducted to investigate the susceptibility of the digital radar correlator. A vulnerability assessment will be provided the project manager for the ASARC/USARC III. Laboratory susceptibility tests will be conducted on the latest COPPERHEAD ECCM modified production model seeker to evaluate and verify seeker performance under different ECM environments. Live firing ECM tests will be conducted and a final vulnerability assessment made. HELIFIRE missile flight simulation models and war game models will be extended to include new seeker concepts and techniques. Studies and laboratory susceptibility investigations will be conducted to evaluate the effects of ECM on HELIFIRE Infrared Imaging fire-and-forget seeker designs. ECM laboratory/field investigations will be performed on Infantry Manportable Assault Antitank Weapon Systems (IMAAWS) candidate systems to evaluate system concepts and performance under specified EW environments. A susceptibility/vulnerability assessment report will be published in support of IMAAWS ASARC II. A final vulnerability assessment report of TOW II will be published following laboratory/field ECM tests of the final design of the improved missile tracking system. Technological threat and countermeasures studies of the Assault Breaker engineering development seeker designs and target acquisition radar will be completed. Prototype ECM devices will be designed and developed. A susceptibility/vulnerability assessment of terminally guided warheads for the Multiple Launch Rocket System (MLRS) will be provided the PM as an input to the ASARC I.

Tri-Service efforts in ECM exploitation will continue.

4. FY 1983 Planned Program: The final phase of Pershing II (PII) ECM captive flight tests will be completed. Preparation for live ECM firing tests will be finalized and tests conducted. Data from those tests will be utilized for verification of the terminal performance simulation model. A study will be conducted to provide a final ECM vulnerability assessment of the PII engineering design. Laboratory/field ECM investigations plus missile flight simulations will be performed on the IMAAWS engineering development model to assess its performance under various EW environments. Analysis and laboratory/field tests of competing Advanced Indirect Fire Systems (AIFS) for cannon artillery weapons and the Sense Armor (SADARM) advanced development seeker will continue so as to identify and establish critical susceptibilities. Timely ECCM recommendations will be provided the developers for improvements during the engineering development phase. Static and

Project: #D234 Title: Interdiction, Suppression, & Counterfire Weapons Vulnerability/Susceptibility
 Program Element: #6.17.18.A Title: Electronic Warfare Vulnerability/Susceptibility
 DOD Mission Area: #454 - Other Test Budget Activity: #6 - Defensewide Mission Support
and Evaluation Support

dynamic closed-loop simulations of infrared imaging, fire-and-forget HELLFIRE, and terminally guided missiles for corp support weapons under development will be conducted using the dynamic infrared background system. Prototype ECM devices will be designed and developed for captive flight and live firing tests during DT/OT.

Tri-Service Service efforts in ECM exploitation will continue.

5. (U) Program to Completion: This is a continuing program.
6. (U) Major Milestones: Not applicable
7. (U) Resources (\$ in thousands):

	FY 1980 <u>Actual</u>	FY 1981 <u>Estimate</u>	FY 1982 <u>Estimate</u>	FY 1983 <u>Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	Not Applicable	Not Applicable			Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	Not Shown					

This project begins in FY 1982.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D267

Title: Air Defense Weapon System
Vulnerability/Susceptibility

Program Element: #6.37.18.A

Title: Electronic Warfare Vulnerability/Susceptibility

DOD Mission Area: 7454 - Other Test and Evaluation
Support

Budget Activity: 76 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: All electronic/electro-optical dependent systems are susceptible to electronic warfare 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 (ECCH) 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 four for other electronic dependent systems. Starting in FY82, those tasks not associated with Air Defense Weapon Systems are under project D234.

B. (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, Ft Monmouth, NJ; Harry Diamond Laboratories, Adelphi, MD; Signals Warfare Laboratory, Vint Hill Farms, VA; and Night Vision and Electro-Optical Laboratory, Ft Belvoir, VA. Results of the susceptibility investigations are provided, as well as appropriate electronic counter-countermeasures (ECCH) recommendations, to the other Army Development Commands; e.g., Missile Command (MICOM) and Communications Research and Development Command (CORADCOM). 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 Program. 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

Project: #D267

Title: Air Defense Weapon System
Vulnerability/Susceptibility

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

Secretary of Defense (Under Secretary of Defense for Research and Engineering). A joint Army, Navy, Air Force and Marine Corps project for electro-optically guided weapons countermeasure tests is being conducted under a program funded by the Under Secretary of Defense for Research and Engineering. The Army is Executive Agent for this program.

C. (U) WORK PERFORMED BY: In-house research, ECM development, exploitation, susceptibility analyses, EW field tests and EW engagement simulations are conducted by the Office of Missile Electronic Warfare, Electronic Warfare Laboratory, US Army Research and Development Command at White Sands Missile Range, New Mexico. Major contractor support is provided by GTE Sylvania, Mountain View, CA; Physical Science Laboratory, New Mexico State University, Las Cruces, NM; HYCOR, Woburn, MA; General Electric, Utica, NY; Hughes Aircraft Co., Culver City, CA; Kentron International Inc., Ft Worth, TX; Sanders Associates, Nashua, NH; General Dynamics Corp., Ft Worth, TX; and Vought Corp., Dallas, TX.

D. (U) PROGRAM ACCOMPLISHMENT AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: ECM vulnerability investigations have been conducted on SAFEGUARD, LANCE, NIKE-HERCULES, SHILLLEACH, DRAGON, TOM, REDEYE, HELLFIRE, COPPERHEAD, Improved HAWK, STINGER, 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 CM devices were conducted. Closed-loop simulations for REDEYE and STINGER in EW environments were performed. Incorporation of ultraviolet and millimeter signature capabilities into these facilities has been completed. The test planning and field operations for the EW portion of the Development Tests/Operational Tests II for PATRIOT were completed, and publication of the vulnerability analysis was completed. A high- to Medium-Air Defense system modulation laboratories facility was completed, and a mobile field environment calibration was placed into operation capable of monitoring multi-aircraft EW performance. The planning for US ROLAND product confirmatory tests has been completed, and the tests have been initiated. Two advanced threat jammers have been contracted to support confirmatory testing. The planning for EW testings of the competitive Division Air Defense Gun System was completed, and testing was initiated to provide data to the source selection board. Design analysis resulting in revision of Stinger-POST ECM software logic was completed, and reports on the deployment and tactics for Stinger-POST were published. Two advanced infrared/ultraviolet jammers were designed, specified, and contracted for development to support both Stinger-POST and Improved Chaparral EW testing to the 1987-and-beyond threat. Vulnerability investigation of several improved HAWK product improvements was completed, and Improved HAWK studies and test planning were started for the Improved Performance Acquisition Radar Emission Control, Improved HAWK Missile ECCM upgrade, and the Improved High-Power Illumination

Project: #9267

Title: Air Defense Weapon System
Vulnerability/Susceptibility

Program Element: #6.37.19.A

Title: Electronic Warfare Vulnerability/Susceptibility

DOD Mission Area: #454 - Other Test and Evaluation
Support

Budget Activity: #6 - Defensewide Mission Support

reliability and maintainability product improvement programs. EW investigations have been conducted on PERSHING II, TOW II, and fire-and-forget HELLFIRE, Sense-and-Destroy Armor (SADARM), Fire System (AIFS), Assault Breaker, and terminally guided warheads for the Multiple Launch Rocket System (MLRS). Since their initial development, numerous theoretical and laboratory ECM investigations have been completed on the evolving designs of the HELLFIRE and COPPERHEAD laser missile systems. A preliminary theoretical EW susceptibility investigation was completed on the Target Acquisition and Designation System/Pilot Night Vision Sight (TADS/PNVS). Highly versatile capabilities to conduct infrared and unintentional radiation measurements have been established, and measurements on aircraft, weapon systems, and countermeasure devices were made. Incorporation of initial ultraviolet signature measurement capabilities into these facilities has been completed and preliminary measurements performed.

2. FY 1991 Program: The EW design efforts of the PATRIOT ECCM Enhancement Program will be initiated with development of advanced threat test jammers and fabrication of field test measurement systems. The PATRIOT tests to be supported include software confirmation, battalion triangulation, antiradiation missile decoy, and interference with early warning aircraft (EJA) tests. The Stinger-POST planned firings will be conducted against the advanced IR-UV threats, and closed-loop simulations will be completed on the preproduction Stinger-POST. Field tests to verify vulnerability assessment of the AN/DAM-1 version of Chaparral will be conducted, and assessment of laser CM hardening will be made by open-loop simulations. The ROLAND system work will provide a comparison of the field test data and semiphenomenological simulations to determine effectiveness of ECCM fixes. The planning, coordination, and conduct of DIVADS follow-on-evaluation (FOE) will be accomplished. Advanced threat jammers under development will be used in DIVADS testing to establish FY 1987 and beyond capabilities or required ECCM. ECM investigations of the PERSHING II engineering development (ED) design will continue. Live firing tests of TOW II missiles against a target equipped with ECM devices will be conducted. EW investigations will be conducted to establish susceptibility levels of the Sense-and-Destroy Armor (SADARM) and Tank Breaker advanced development missile seekers. Analysis of the laser beamrider Infantry Manportable Assault Antitank Weapon System (IMAAWS) will continue.

EW investigations will be conducted of the latest models of the HELLFIRE and COPPERHEAD seekers. ECM investigations including optical signature measurements will be conducted on the Target Acquisition and Designation System/Pilot Night Vision System (TADS/PNVS). A review of the Assault Breaker (AB) target acquisition and

Project: #0267

Title: Air Defense Weapon System

Vulnerability/Susceptibility

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

seeker/sensor designs will be completed and a study initiated to identify potential ECM techniques and susceptibilities of Assault Breaker and terminally guided warheads (TGW) for the Multiple Launch Rocket System (MLRS). Analysis of imaging/millimeter seekers for the Advanced Indirect Fire System (AIFS) will continue.

and efforts on other electronic devices/systems will be initiated. Signature measurements will be continued in support of EW vulnerability analysis with emphasis on the ultraviolet-imager-obtained background characterizations during ECM field tests of STINGER-POST for input to government and contractor missile simulation investigations. Simulation models for evaluation of PATRIOT, ROLAND, and Improved CHAPARRAL fuzes will be updated to include responses to chaff. Artillery fuze EW susceptibility/vulnerability assessments will be initiated.

3. (U) FY 1982 Planned Program: The PATRIOT Enhancement program will continue with emphasis on ECCM software capabilities and the effects of low cross-section targets, improved guidance, multifunction capabilities and radar ECM control functions using advanced threat-level responsive coherent deception techniques. EW analysis of PATRIOT extended range program will also be pursued. Simulations on the production configuration of STINGER-POST will be completed to verify ECCM capabilities. CM analysis of the multipurpose lightweight missile will be conducted to establish the effectiveness of STINGER-POST application to this missile concept. Upon delivery of the Advanced Chaparral EOCM device, flyby and tracking missions will be conducted with special emphasis on laser CM techniques. A theoretical study of detailed ECCM threat parameters will be conducted to establish advanced threat trends for vulnerability analysis of Electro-Optical Air Defense systems. Laboratory experimentation to establish the directed energy threat against Air Defense systems will be initiated and initial vulnerability assessments published. The ROLAND confatory tests will be conducted to validate ECCM production fixes and establish Air Defense response to advanced threats. Conduct advanced ECM/ECCM testing of the DIVADS Gun System during initial production tests using threat-level EW test jammers to formulate EW vulnerability conclusions for DIVAD Gun System.

4. FY 1983 Planned Program: _

Stinger-POST live firing missions will be conducted to evaluate CCM improvement in production design. The vulnerability investigation of advanced imaging seekers will be initiated. Advanced ECM/ECCM investigation and testing of the Improved Chaparral will be conducted, and EW vulnerability conclusions

Project: D0267

Title: Air Defense Weapon System

Vulnerability/Susceptibility

Program Element: #6.17.18.A

Title: Electronic Warfare Vulnerability/Susceptibility

DOD Mission Area: #454 - Other Test and Evaluation
Support

Budget Activity: #6 - Defensewide Mission Support

will be provided for the in-process review. The postulated EW threat against directed energy air defense systems will be simulated, and laboratory vulnerability assessments to this threat will begin. ROLAND confirmatory tests will be conducted to establish this system's response to projected threats. The prototype DIVAD Gun System will be tested against the increased power capability of advanced threats, and vulnerability conclusions will be provided for the initial production decision.

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

6. (U) Major Milestones: Not applicable.

7. Resources (\$ in thousands):

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
RDTE						
Funds (current requirements)	13,789	17,735			Not Applicable	Not Applicable
Funds (as shown in FY 1981 submission)	14,884	18,659		Not Shown	Not Applicable	Not Applicable

Decreases in FY 1980 and FY 1981 are due to reprogramming to meet higher priority requirements. The decrease in FY 1982 is due to the restructuring of this project into three projects (D190, D234, and D267).

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.38.4

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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimate Costs
	TOTAL FOR PROGRAM ELEMENT	1000	2550	1412	7209	Continuing	Not Applicable
A115	NSTD Infantry	0	0	0	0	Continuing	Not Applicable
A224	NSTD Armor/Antiarmor	1000	2580	1412	5032	Continuing	Not Applicable
A225	NSTD Artillery/Air Defense Engineer	0	0	0	2177	Continuing	Not Applicable
A226	NSTD Combined Arms	0	0	0	0	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEEDED: This program provides for the Advanced Development of Non-System Training Devices. 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. Modern weapons systems will be integrated into the force at an unprecedented rate in the 1980's. Arrival of this sophisticated, complex equipment will coincide with increased constraints on people, dollars, and time in a training environment where ammunition and fuel costs continue to rise. Training devices and training simulation provide force multipliers that can improve combat effectiveness and provide more realistic training while helping to control the rapidly escalating costs. 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. 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. Improved training devices, now available through modern technology, must continue to be developed to provide the training required to prepare US soldiers to fight outnumbered and win.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Requested funds will be used to initiate Advanced Development of the Tank Weapons Gunnery Simulation System (TWGSS) and to complete Advanced Development of the Armor Remoted Target System (ARETS). In addition, the Armor Remoted Target System will be installed at Fort Knox, and operational testing will be conducted on the system.

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Program Element: #6.1.38.A Title: Non-Systems Training Devices (NSTD) Development
DOD Mission Area: #430 - Non-Systems Training Devices Budget Activity: #6 - Defensewide Mission Support

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	1000	2580	1412	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	2950	2771	4843	Continuing	Not Applicable

The reduction in FY 1980 funding resulted from:

a. A226 - The Automatic Weapons Effect Signature Simulator (AWESS) completed Exploratory Development in FY 1979 and a decision was made to proceed directly into Engineering Development. Thus, the FY 1980 Advanced Development funds were reprogrammed into higher priority Army projects.

b. A224 - \$1000 thousands was reprogrammed into higher priority Army projects as a result of a refined cost estimate of the FY 1980 funds needed to support the Armor Remoted Target System (ARETS).

The decrease of \$191 thousand in FY 1981 funding reflects the application of general Congressional reductions.

The reduction in FY 1982 reflects the combined effects of the following:

a. A224 - Increased funding requirement to complete Advanced Development on the Armor Remoted Target System (ARETS); decreased funding requirement due to reduction of planned effort on the Tank Weapons Gunnery Simulation System (TWGSS); and realignment of the program to reflect incremental funding policies.

b. A226 - Deferral of effort on the Electronic Warfare Simulators to fund other higher priority Army programs.

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Program Element: #6.37.38.A

Title: Non-Systems Training Devices (NSTD) Development

DOD Mission Area: #430 - Non-Systems Training Devices

Budget Activity: #6 - Defensewide Mission Support

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

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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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This continuing program provides for the Advanced Development of training devices which are engineered 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 or branches of the Army for which they are developed. During any given year, one or more training devices may be under development within each project. In FY 1982 the Tank Weapons Gunnery Simulation System (TWGSS) will enter Advanced Development. This system will utilize simulation devices to provide training in the acquisition, engagement, and adjustment of fire upon stationary and moving land targets by a stationary or moving firing tank. This system will develop, maintain, and objectively evaluate individual and crew proficiency in all tank gunnery skills without the use of live ammunition or dedicated range facilities. Presently there is no way to adequately integrate total tank gunnery skills into tactical training, and the evaluation of gunnery proficiency is subjective at best. The Tank Weapons Gunnery Simulation System will provide a solution to both. The Armor Remoted Target System (ARETS) will complete Advanced Development in FY 1982. 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 device supply channels. Not only must this situation be remedied, but emphasis must be placed on realistic target 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 the capability of cost-effectively sensing and automatically scoring .50 caliber, 20mm, 105mm, 152mm inert service ammunition and tank TOW and DRAGON missiles. It will provide challenging training under simulated battle conditions in tactical gunnery, including target acquisition and engagement against massed enemy formations portraying threat scenarios.

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). This coordination is designed to preclude any unnecessary duplication of effort. 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).

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:

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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

1. (U) FY 1980 and Prior Accomplishments: Advanced Development (AD) to include Operational Test (OT) was completed on the Infantry Remoted Target System (IRETS) and the Marksmanship and Gunnery Laser Device (MAGLAD). Initial system design specifications were completed for the Armor Remoted Target System (ARETS).

2. (U) FY 1981 PROGRAM: Advanced Development will continue on the Armor Remoted Target System (ARETS) which is designed to provide an integrated solution to the target needs of the armor community. The Armor Remoted Target System will be designed to sense and subsequently score service ammunition and laser energy. Components will include control devices, stationary and moving target mechanisms, two- and three-dimensional targets, hostile fire simulators, muzzle flash simulators, and hit indicators. The control unit will be capable of automatic scoring and recording so that accurate and complete evaluation can be accomplished. Advanced Development of the Eye-Safe Simulated Laser Rangefinder (ESSLR) will be initiated and completed in FY 1981. This device will be an attachment for the tank laser rangefinder to provide eye-safe laser training. It shall be eye-safe at all ranges when viewed through 13X sighting optics, activated by the crew, and shall provide exactly the same system input and scaled range accuracy as the operational laser rangefinder.

3. (U) FY 1982 PLANNED PROGRAM: Design and engineering effort on the Armor Remoted Target System (ARETS) will be completed. The ARETS system will be installed at Fort Knox, KY, and operational testing will be conducted. Advanced Development will be initiated on the Tank Weapons Gunnery Simulation System (TWGSS) which will utilize simulation to integrate total tank gunnery skills into tactical training.

4. (U) FY 1983 PLANNED PROGRAM: The design and engineering effort on the Tank Weapons Gunnery Simulation System (TWGSS) will be continued. Advanced Development on the Indirect Fire Shootable Simulator (IFSS) will be initiated. This system will provide the means of simulating the effects of indirect fire weapons during combined arms tactical engagement simulation exercises.

5. (U) PROGRAM TO COMPLETION: This is a continuing program.

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FY 1982 RDTF CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.68.A

Title: Component Improvement Program

DOD Mission Area: #671 - General Management Support

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8700	8940	11842	12223	Continuing	Not Applicable
D106	Component Improvement Program	8700	8940	11842	12223	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides, through engineering development support, essential improvements in aircraft engines encompassing the areas of flight safety, reliability, maintainability, durability and the correction of service-revealed deficiencies. This effort is essential to reduce the time between overhauls, foster a general reduction in maintenance man-hours and resources required to sustain aircraft engines in service, and ultimately substantially reduce life cycle costs. The engine Component Improvement Program (CIP) provides a continuing engineering base for the efficient resolution of Service-Revealed Difficulties (SRD) arising or anticipated during future field use of the engines.

C. (U) BASIS FOR FY 1982 RDTF REQUEST:

1. (U) T700: The T700 engine is qualified and in production for the UH-60A BLACK HAWK helicopter and is included in the Army AH-64 Advanced Attack Helicopter program. The engine has been very successful and the service-revealed difficulties that have been encountered have been quickly resolved. As a result of the ongoing T-700 Component Improvement Program, significant improvements have been made in reliability, maintainability and in cost-avoidance in both acquisition and life cycle costs. The requested funds in FY 1982 will permit continuing this program of support and test of critical components and engine accessories during the early production phases to maintain this success. Improvements will be sought in durability, life extension, and cost reduction projects specifically in the areas of bearings, seals, fuel control, combustor module and inlet particle separator.

(U) T55-L-712: This T55 engine version utilized in the CH-47D (Modernization Aircraft) has been qualified, and a limited number are being evaluated in a field environment. Although the service-revealed difficulties to date have been small in program impact, the potential for continued service-related problems remains relatively high during this early period. The funds requested in FY 1982 will permit continuing support of this effort as well as performance of extended service life

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Program Element: #6.42.68.A

Title: Component Improvement Program

DOD Mission Area: #471 - General Management Support

Budget Activity: #6 - Defensewide Mission Support

and endurance testing to resolve any reliability, maintainability, and manufacturing problems that appear during the fabrication of further engine modification kits.

2. (U) The T700 and T55 Component Improvement Programs are extremely cost effective in that problems can be anticipated or discovered early in the production phase and corrections implemented before large quantities of engines are dispersed throughout the system. The cost avoidance in preventing problems and expensive worldwide retrofit programs on other engines has historically exceeded the cost of previous engine Component Improvement Programs.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Addition To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	8700	8940	11842	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	8700	15400	13016	Continuing	Not Applicable

FY 1980 Defense Appropriation Bill moved the Component Improvement Program funds from the Procurement Appropriation to the RDTE account. The difference in FY 1981 funds is due to general Congressional reductions. The differences in funds shown in FY 1982 are the result of internal reprogramming to higher priority Army programs.

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

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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. The Component Improvement Programs (CIP's) for engines are required on production engines to solve technical problems which arise from fielding and using the engines in aircraft systems. Its objective is to detect and correct field-generated problems prior to these problems having detrimental effects on in-flight engine operation and logistics support costs. Key to engine CIP is long term testing of production configuration engines in order to predict engine problems which can occur during the engine's entire field life. This testing attempts to duplicate actual field operation. Through component testing, problem areas are defined and fixes are generated before failures can occur in the field. One advantage of this system is that it identifies life-limited parts, forewarns logisticians of spare part requirements, and prevents secondary damage to the engine and aircraft by scheduling removal of a part prior to reaching its life limit. The other projects undertaken in the CIP are cost reduction opportunities because of new manufacturing processes or advances in the state-of-the-art in materials, and new or revised field requirements such as emergency fuels and new engine operating environments.

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.

H. (U) WORK PERFORMED BY: This work is performed or managed by the Product Managers for UH-60A BLACK HAWK, 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 1980 and Prior Accomplishments: To date, it is estimated that the T700 Maturity Program and Component Improvement Program (CIP) have potentially saved more than \$130 million in operational costs over the anticipated life of the engine. It has corrected two compressor rub safety-of-flight problems--#4 engine bearing failures--and has established a life limit on the inlet particle separator blower. By the end of the FY 1980 CIP, over 2500 hours of accelerated mission testing had been completed on two engines. Component spin tests have been run to confirm low cycle fatigue life of the stage 1 and stage 2 turbine discs and have resulted in an improved disc which meets the 15,000-hour fatigue cycle requirement for the disc. This program has also led to the qualification of improved life turbine rotors, an improved electronic control unit seal, an improved mounting bracket, improved engine bellows, and a new cam device in the hydromechanical control unit for better engine low power characteristics. For the T-55-L-712 engine, the Component Improvement Program has been oriented to redesign/qualification of engine components that have caused premature engine removals in the field. Improvements for the

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Program Element: #6.42.68.A

Title: Component Improvement Program

DOD Mission Area: #471 - General Management Support

Budget Activity: #6 - Defensewide Mission Support

T55 engine are directed towards maintaining the predicted Mean Time Between Depot Removal of all Cases (MTBDRA) of 1150 hours and a Mean Allowable Operating Time (MAOT) of 2400 hours. These efforts have been underway since FY 1976. Although the T-55-L-712 qualification resulted in a configuration many times superior to the present T55, specific areas which have been identified for further improvement include: #4 and 5 bearing temperature problems, an improved torque mixer, and improved stator vane material for the first and second stage compressor disc and the first stage gas producer nozzle in conjunction with an improved combustor liner material.

2. (U) FY 1981 Program: T700: Accelerated mission testing and component spin testing will continue but at a slower rate because of a general Congressional reduction in funds.

(U) T55: The FY 1981 effort includes an improved lubrication pump, improved power turbine bearing package, engine clutch drag study, and fuel control improvements. A procurement specification for an electronic fuel control is also being prepared.

3. (U) FY 1982 Planned Program: Tasks include accessory gearbox improvements, improved torque measuring system, development of an engine dynamic simulation model and 1500 hours of engine testing as well as continuation of other ongoing efforts to maintain required and projected engine reliability and durability goals for both the T 700 and T-55 engines. These efforts will supplement those executed in FY 1981.

4. (U) FY 1983 Planned Program: Continuation of engine testing is planned, and efforts will be initiated to improve compressor performance and engine maintainability in keeping with durability, life extension and cost reduction goals.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.47.15.A

DOD Mission Area: #630 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Engineering

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	9554	11812	17245	8493	Continuing	Not Applicable
D237	NSTD Artillery/Air Defense/Engineer	4016	2244	2090	1507	Continuing	Not Applicable
D239	NSTD Infantry	731	1869	530	944	Continuing	Not Applicable
D241	NSTD Combined Arms	1996	5212	5794	1236	Continuing	Not Applicable
D572	NSTD Armor/Ant Armor	325	0	1611	1563	Continuing	Not Applicable
D573	PM-Trade (Project Manager for Training Devices) and Naval Training Equipment Center (NTEC) Support	2486	2487	3220	3443	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEEDED: This program provides for the Engineering Development of Non-System Training Devices. 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. Modern weapons systems will be integrated into the force at an unprecedented rate in the 1980's. Arrival of this sophisticated, complex equipment will coincide with increased constraints on people, dollars, and time in a training environment where ammunition and fuel costs continue to rise. Training devices and training simulation provide force multipliers that can improve combat effectiveness and provide more realistic training while helping to control the rapidly escalating costs. 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. 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. Improved training devices, now available through modern technology, must continue to be developed to provide the training required to prepare US soldiers to fight outnumbered and win.

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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

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Requested funds provide for continued Engineering Development of the Army Training Battle Simulation System (ARTBASS) and for completion of Engineering Development of the Air-Ground Engagement System (AGES), Air Defense Simulator (ADS), Infantry Remoted Target System (IRETS), and Automatic Weapons Effects Signature Simulator (AWESS). Engineering Development will be initiated on Mine/Countermine Casualty-Producing Simulation (MICAPS), and Marksmanship and Gunnery Laser Device (MAGLAD). Two systems, Eye-Safe Simulation Laser Rangefinder (ESSLR), and Scaled-Range Target System (SRTS), will both begin and complete Engineering Development since they are projected for only a one-year 6.4 effort. Requested funds 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 and continues funding a joint Army/Navy agreement which makes available for Army use the resources of the Naval Training Equipment Center (NTEC).

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	9554	11812	13245	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	8837	11820	16749	Continuing	Not Applicable

The increased FY 1980 funding resulted from a revised cost estimate and resultant reprogramming into Project D237 to continue effort on Air-Ground Engagement System (AGES) and Air Defense Simulator (ADS).

The decrease of \$8 thousand in FY 1981 funding reflects the application of general Congressional reductions.

The reduction in FY 1982 funding resulted from the combined effects of: termination of the Tank-Appended Crew Evaluation Device (TACED) effort under Project D572 to fund other higher priority Army projects; realignment of the program to reflect incremental funding policies; and the application of different fuel, inflation, and civilian pay pricing indices than were applied last year.

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Program Element: #6.47.15.A

Title: Non-Systems Training Devices (NSTD) Engineering

DOD Mission Area: #410 - Non-Systems Training Devices

Budget Activity: #6 - Defensewide Mission Support

E. (U) OTHER APPROPRIATION FUNDS:

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Other Procurement, Army:						
Funds (current requirements)	48700	42900	41700	73700	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	49500	11100	48500	-	Continuing	Not Applicable

It is not feasible to list the quantities and Military Construction Costs because of the type and quantity of the different training devices. The reduction in FY 1980 funding resulted from reprogramming into a higher priority Department of the Army project (TACFIRE).

The increase in FY 1981 funding resulted from a Congressional decision to complete procurement of the Multiple Integrated Laser Engagement System (MILES).

The decrease in FY 1982 funding resulted from deletion of the Multiple Integrated Laser Engagement System (MILES) (funded in FY 1981 by Congress).

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Program Element: #9.47.15.A

DOD Mission Area: #430 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Engineering

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 1982 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 complete development. 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 complete development. 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. In addition, the Eye-Safe Simulated Laser Rangefinder (ESSLR) will be an attachment for the tank laser rangefinder to provide eye-safe laser training. It will provide exactly the same system input and scaled range accuracy as the operational laser rangefinder. The Army Training Battle Simulation System (ARTBASS) will provide 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 inventory of standard target mechanisms and range control systems for fixed infantry marksmanship ranges is 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 while the Scaled-Range Target System (SRTS) will provide a modularized, subcaliber, tank gunnery system for the armor community. A third marksmanship device under development is the Marksmanship and Gunnery Laser Device (MAGLAD). This device will be used on reduced-scale indoor ranges and offers an active means of improving marksmanship training.

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Program Element: #6.47.15.A

DDO Mission Area: #410 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Engineering

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). This coordination is designed to preclude any unnecessary duplication of effort. 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 are Xerox Electro-Optical Systems, Inc., Pasadena, CA, and Singer Company (Link Division) Binghamton, NY. 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 1980 and Prior Accomplishments: Engineering, fabrication, and operational/developmental testing were completed and production was begun on the Multiple Integrated Laser Engagement System (MILES) and the Antitank Weapons Signature Simulator (ATWESS). Engineering, fabrication, and operational/developmental testing were completed for the Observed Fire Trainer (OFT). Development was completed and production was begun on the Blank Firing Adopter (BFA) which will permit firing of linked blank .50 caliber ammunition in the M2 and M85 machine guns.

2. (U) FY 1981 Program: Engineering Development (ED) of Infantry Remoted Target System (IRETS) was initiated. This system will provide an integrated solution to the small arms marksmanship target needs of the infantry community. It will feature automatic 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. Engineering Development (ED) on the Automatic Weapons Effects Signature Simulator (AWRESS) was initiated. The AWRESS is a training device to simulate the firing signature of the Army's full family of machine guns (calibers .50 on .762 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. Engineering Development (ED) of the Air-Ground Engagement System (AGES) continues. 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 combat arms exercises. The air-to-ground weapons simulated will

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Program Element: 06.47.15.A

DOD Mission Area: #430 - Non-Systems Training Devices

Title: Non-Systems Training Devices (NSTD) Engineering

Budget Activity: #6 - Defensewide Mission Support

include TOW, HELLFIRE, 20/30mm machine cannons and other air-delivered munitions. Engineering Development (ED) of Air Defense Simulators (ADS) continues. This system will provide lasers to simulate the firing characteristics of the CHAPARRAL, VULCAN, REDEYE, and STINGER air defense weapons. The objective of this effort is to provide a realistic means of simulating air defense measures against helicopters and ground support aircraft and allow the inclusion of *realtime casualty assessment* in combat arms exercises. Engineering Development (ED) of the Army Training Battle Simulation System (ARTBASS) continues. This device will allow the training of leaders and staffs to cope with the complex and sophisticated environments they will face on 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*. Engineering Development (ED) will be initiated and completed on the Alpha Radiac Training Device for the AN/PDR-56 Radiacmeter. This device will allow Alpha and EOD Teams to practice Alpha Radiation monitoring and survey techniques without being exposed to hazardous radiation. The trainer will consist of two hot-spot simulators, four mini transmitters, and four simulated AN/PDR-56 radiacmeters. The *simulated radiacmeters* will exactly represent the operational equipment in appearance, operating controls, and meter readings.

3. (U) FY 1982 Planned Program: Engineering Development (ED) of the Air-Ground Engagement System (AGES), Air Defense Simulators (ADS), Infantry Remoted Target System (IRETS), and Automatic Weapons Effect Signature Simulator (AWESS) will be completed. Engineering Development on the Army Training Battle Simulations System (ARTBASS) will be continued. Engineering Development (ED) of the Eye-Safe Simulated Laser Rangefinder and the Scaled Range Target System (SRTS) will be initiated and completed. The Eye-Safe Simulated Laser Rangefinder will be an attachment for the tank laser rangefinder to provide eye-safe laser training. It will be eye-safe at all ranges when viewed through 13X sighting optics, activated by the crew, and will provide exactly the same system input and scaled-range accuracy as the optical laser rangefinder. The Scaled Range Target System (SRTS) is a modularized, subcaliber, tank gunnery system designed to provide pop-up and serpentine moving hard targets for .22 caliber and 5.56 live fire and retroreflective targets for the M55 tank gunnery laser trainer. Each Scaled-Range Target System will be composed of up to fifty (50) target mechanisms. Engineering Development (ED) of the Marksmanship and Gunnery Laser Device (MAGLAD) will be initiated. 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. Engineering Development (ED) of the Mine/Countermine Casualty-Producing Simulation (MICAPS) will be initiated. This 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. All necessary experimental work will be performed and the proposed systems will be ready for full-scale development.

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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

4. (U) FY 1983 Planned Program: Engineering Development of the Army Training Battle Simulation System (ARTRASS), the Marksmanship and Gunnery Laser Device (MAGLAD), and the Mine Casualty-Producing Simulation (MICAPS) will be continued. Engineering Development (ED) of the Armor Remoted Target System (ARETS) will be initiated. This system will provide an integrated solution to the target needs of the armor community. The Armor Remoted Target System (ARETS) will be designed to sense and subsequently score service ammunition and laser energy. Components will include control devices, stationary and moving target mechanisms, two- and three-dimensional targets, hostile fire simulators, and hit indicators. The control unit will be capable of automatic scoring and recording so that accurate and complete evaluation can be accomplished. 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.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D241

Program Element: #6.47.15.A

DOD Mission Area: #430 - Non-Systems Training Devices

Title: Non-Systems Training Devices Combined Arms

Title: Non-Systems Training Devices (NSTD)

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 1982 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 casualty rates in 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. The Army Training Battle Simulation System (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 system 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 Automatic Weapons Effects Signature Simulator 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). This coordination is designed to preclude unnecessary duplication of effort. 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).

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 Contractor for the engineering development effort on the Army Training Battle Simulation System (ARTBASS) is Singer Company, Silver Springs, MD.

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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 1980 and Prior Accomplishments: An Engineering Development (ED) contract for the Army Training Battle Simulation System (ARTBASS) was awarded to Singer Company in FY 1980.

2. (U) FY 1981 Program: Engineering Development (ED) of the Army Training Battle Simulation System (ARTBASS) will be continued. 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. Engineering Development (ED) will be initiated 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 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. Engineering Development (ED) will be initiated and completed on the Alpha Radiac Training Device for the AN/PDR-56 Radiac Meter. This device will allow Alpha and EOD teams to practice Alpha Radiation Monitoring and Survey Techniques without being exposed to hazardous radiation. The trainer will consist of two hot-spot simulators, four mini-transmitters, and four simulated AN/PDR-56(F) radiacmeters. The simulated radiacmeters will exactly represent the operational equipment in appearance, operating controls and meter readings.

3. (U) FY 1982 Planned Program: Engineering Development (ED) on the Army Training Battle Simulation System will be continued and ED on the Automatic Weapons Effects Signature Simulator will be completed.

4. (U) FY 1983 Planned Program: Engineering Development (ED) of the Army Training Battle Simulation Systems (ARTBASS) will be completed.

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

6. (U) Major Milestones:

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Project: #0241 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

<u>Major Milestones</u>	<u>Current Milestone Dates</u>	<u>Milestone Dates Shown in FY 1981 Submission</u>
ARTBASS - IOC	Aug 84	Aug 84
ANESS - IOC	Aug 83	Aug 83

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	1995	5212	5794	1036	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	1996	5163	5651	-	Continuing	Not Applicable

Increase in FY 1981 and FY 1982 funding resulted from the application of higher inflation, civilian pay, and fuel pricing indices than were applied last year.

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	8079	2687	2145	2223		
D511	Meteorological Data Systems (AN/TMQ-31)	8079	2687	2145	2223	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The main thrust of this engineering development program is to develop meteorological equipment and systems to obtain observations and other realtime meteorological (MET) data of the atmosphere required for effective planning and conduct of Army combat operations. One of the major meteorological system development projects is the Meteorological Data System AN/TMQ-31 (MDS) (formerly called the Field Artillery Meteorological Acquisition System (FAMAS)), designed to replace the aging AN/GMD-1 Rawinsonde System for the measurement of upper air windspeed and wind direction, temperature, humidity, and pressure. The MDS is the newest type of system that provides accuracies, flexibility, and features not available in other atmospheric sounding systems. It is being designed in support of Army artillery fire, but also provides data for other Army users. The purpose of the MDS is to give the artillery sections the improved capability of first-round hits, even in areas obscured from observers, by providing reliable, fresh (hourly) and comprehensive MET data. These data are obtained through the available passive techniques of Navigational Aids (NAVAID) or Radio Direction Finding (RDF) radiosonde tracking systems. The MDS combines both techniques into a small system in which the fully automatic ground receiving, computing, display, and transmitting equipment is housed in an S-280 shelter (on a 2-1/2-ton truck) and the RDF antenna/podestal is on a 1-1/2-ton trailer. Other required MET equipment and systems will progress to this project in the outyears.

C. (U) BASIS FOR FY 1982 RDTE REQUEST:

1. (U) This program specifically addresses present operational deficiencies in the Army's ability to rapidly acquire, process, and disseminate meteorological parameters that affect deployment and operations of weapon systems as identified in the

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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

ROC for the MDS (CARDS Reference Number: 0449). The Field Artillery (FA) has stated that it urgently requires a highly mobile, lightweight, near-realtime meteorological data acquisition system 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 to the forward area of the battlefield. The AN/GMD-1 uses manual data reduction requiring a 14-man section and does not interface with the Tactical Fire Direction System (TACFIRE) or the Multiple Launch Rocket System (MLRS). The FY 1982 RDTE funds are required to continue Engineering Development (ED) of the Meteorological Data System, AN/TMQ-31 (MDS), which is urgently required by the Field Artillery to assure maximum combat effectiveness on the modern-day battlefield. 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) (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 MET sections in the forward battle area to reduce the effect of single station degradation of meteorological data. This MDS engineering development effort is in keeping with the Army's requirement to have qualitative equivalence with Soviet-fielded systems by 1985. Development Test II (DT II) and Operational Test II (OT II) of the MDS, AN/TMQ-31 will be conducted, and an independent evaluation of the system will be completed. In addition, Development Acceptance Test and In-Process Reviews (DEVA-IPR) will be accomplished. The initial MDS procurement package will be prepared, and a contract will be awarded for long-lead items. Engineering development models of the AN/TMQ-31 will be refurbished. Effort is also underway on an improved AN/TMQ-31 Radio Direction Finding (RDF) antenna to provide improved low-angle tracking (ideally down to 6.5 degrees). The improved RDF antenna will exhibit reduced weight and size along with decreased march order-time. It would be most advantageous to the Army to initiate the development of the improved antenna in late FY 1982 or early FY 1983 in order to have an orderly phase-in of the new antenna with the second buy of the AN/TMQ-31 in FY 1985. Further, it would cost more to retrofit fielded systems than to upgrade during production.

2. (U) The total development costs were validated by the Comptroller, US Army Electronics Research and Development Command's (ERADCOM'S) Cost Estimate Control Data Center (CECDC), Adelphi, Maryland. The total development costs appear to be reasonably close to the original planned development cost estimates. The contract has been awarded for the engineering development models of the AN/TMQ-31, and the dollars currently being expended are close to the original estimates. The Defense Contract Administrative Service (DECAS) audits are being conducted on a regular basis, as required.

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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

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Complete Engineering Development of the MDS (AN/TMQ-31):	1Q FY 1982	1Q FY 1982
Complete Development Test (DT) II:	2Q FY 1982	Not Shown
Operational Test (OT) II of the MDS AN/TMQ-31):	3Q FY 1982	3Q FY 1982
Complete Type Classification Standard:	4Q FY 1982	4Q FY 1982
Contract Awarded for Low-Rate Initial Production:	4Q FY 1982	4Q FY 1982
Initial Operational Capability (IOC):	1Q FY 1984	1Q FY 1984
Contract Awarded for Full-Scale Production:	1Q FY 1985	1Q FY 1985

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	8079	2687	2145	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	8077	2886	1990	Continuing	Not Applicable

RDTE funding were increased in FY 1982 to meet the expedited schedule of conditionally fielding ten Meteorological Data System (AN/MQ-31) to Europe by the first quarter of FY 1984. The Army is mandated by the Federal Republic of Germany (FRG) to terminate operation of the current obsolete AN/CMD-1 Rawinsonde systems that interferes with their satellite control frequencies not later than December 1983.

Decrease in FY 1981 is attributable to the application of a general inflation reduction by Congress.

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>To Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Other Procurement Army:						
Funds (current requirements)	0	0	24300	0	61560	85860
Funds (as shown in FY 1981 submission)	0	0	13200	Not Shown	70510	83710
Quantities (current requirements)	0	0	30	0	106 AN/TMQ-11	Meteorological Data Systems
Quantities (as shown in FY 1981 submission)	0	0	20	Not Shown	150 AN/TMQ-11	Meteorological Data Systems
Military Construction, Army:						
Funds (current requirements)	0	0	0	0		
Funds (as shown in FY 1981 submission)	0	0	0	0		

Presently, funding provides for procurement of 30 AN/TMQ-11 Meteorological Data Systems in FY 1982 and none in FY 1983. The initial purchase of 30 AN/TMQ-11 Meteorological Data Systems will: (1) provide replacement for the 10 AN/GMD-1 systems in Germany; (2) provide 2 systems for the training base at Fort Sill; (3) provide 2 systems for Forward Deployment (NATO); (4) provide 9 systems for the Rapid Deployment Force (RDF) and 7 systems for POMCUS.

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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 US Army Field Artillery (FA) urgently requires a highly mobile, lightweight, automated data processing and meteorological (MET) data acquisition system with nonradiating ground-based components, to assure maximum combat effectiveness of the Field Artillery on the modern-day battlefield. Existing atmospheric sounding equipment, AN/GMD-1, type classified Standard A in 1949, is not suitable for fulfilling artillery MET requirements in the areas of mobility, timeliness of data, reliability, manpower utilization, and accuracy. The components were individually developed over a period of a decade, resulting in a system that does not lend itself to significant technical advances through product improvement. Manual data reduction significantly degrades the accuracy of the final product and consumes a disproportionate share of available manpower and time. Presently, the Army requirement is to replace the AN/GMD-1 with the new Meteorological Data System (MDS). The MDS combines mobility, computer technology, and operational flexibility to produce the timely, accurate MET data essential for maximizing field artillery effectiveness. The MDS provides battlefield MET conditions hourly. The non-radiating computer-controlled ground station acquires MET data from a balloon-borne radiosonde, prepares Standardization Agreement (STARAG) formatted messages, and distributes realtime MET information to users via integral communications devices. Atmospheric condition from surface to 39 km altitude are available for correcting artillery fires, weather forecasting, nuclear, biological, and chemical (NBC) operations, and tactical decisionmaking. Designed to operate in the vicinity of the FEBA, the MDS has mobility equal to the weapons systems it supports. Short-setup and march-order times allows the MDS to deploy quickly and as often as battlefield conditions dictate. The ability to collect MET data while on the move, adds a new dimension to tactical MET support. Navigational Aids (NAVAIDS) wind-finding feature of the MDS relieves the necessity for static positioning of MET equipment and allows atmospheric soundings to be made in those most significant to the tactical requirements. The MDS equipment standardization centers around the fully militarized AN/UYK-19 System Processing Unit. Capabilities include manual and automatic data entry, display, processing, editing, printout, and communications net monitoring. System software converts telemetered MET information to real values of pressure, temperature, humidity, wind direction, and speed. This data is processed and stored in tables as the sounding continues. Requests for MET messages are serviced immediately and available data is formatted and transferred to the selected communication device. Computer processing significantly increases both the timeliness and accuracy of completed MET messages and at the same time decreases personnel requirements. One man can monitor system equipment while the sounding is in progress. Predominately 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 responses and capability to deliver first-volley effective fires. Dynamic weather conditions in the threat area of operations dictate the need for timely, accurate MET data for the correction of artillery fires. Multiple finding techniques virtually assure MDS operational availability under all weather and terrain conditions. A 403 MHz radiosonde equipped with a NAVAID receiver functions in any area where LORAN C, D, VLF or OMEGA signals are available. A 168-MHz sonde tracked by the trailer-mounted action-finding (RDF) subsystem may be employed in areas

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where NAVAID signals are absent. The 1680 MHz sonde may also be configured to simultaneously provide both NAVAID and RDF winds. This mixed mode of operation promises accurate wind data at all altitudes. Visual balloon tracking via a synchro-equipped theodolite adds another option. Theodolite data is automatically read into the computer and may be used independently or in conjunction with radiosonde-based height data. Modularity in construction allows the system to be updated as needed to retain maximum flexibility.

G. (U) RELATED ACTIVITIES: 6.11.02.A, Project B53A, Atmospheric Sciences; 6.21.11.A, Atmospheric Investigations; and 6.37.41.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 (ICAMR), and the Annual Symposium on Meteorological Observations and Instrumentation, sponsored by the American Meteorological Society.

H. (U) WORK PERFORMED BY: This program is the responsibility of the US Atmospheric Sciences Laboratory, ERADCOM, White Sands Missile Range, New Mexico, with work performed by the Combat Surveillance and Target Acquisition Laboratory, ERADCOM, Ft Monmouth, NJ. Bendix Corporation (Environmental Science Division), Baltimore, MD, is the prime contractor for fabrication of the Engineering Development (ED) prototype models of the AN/TMQ-31.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1980 and Prior Accomplishments: Meteorological Balloon, ML-537; Balloon Inflation and Launching Device, JL-595; and the Meter Volume, Hydrogen-Helium, were developed, type classified, and procured for field use. The Meteorological Measuring Set, AN/TMQ-22, was developed and type classified as standard equipment. Service testing of the Mobile Weather Radar, AN/TPS-41, was 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. A contract was awarded to Bendix Corporation, Baltimore, MD, for fabrication of five (5) ED prototype 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.

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2. (U) FY 1981 Program: Fabrication of engineering development (ED) prototype models of the AN/TMQ-31 will be completed. Contractor acceptance tests will be conducted. Training of test personnel will be conducted. Draft manuals will be finalized. Development Test (DT) II will be initiated. A special In-Process Review (IPR) will be conducted on LP classification for long-lead items.

3. (U) FY 1982 Planned Program: DT II will be completed and Operational Tests (OT) II conducted. Independent evaluation reports will be completed, and Development Acceptance In-Process Review (DEVA IPR and type classification will be conducted. The present AN/TMQ-31 Radio Direction Finding (RDF) antenna poses problems for tactical deployment, transportability and set-up time. The greatest problem occurs when the radiosonde descends below 17 degrees above an object on the horizon. Interference in the form of signal reflections creates erroneous wind data. New technology permits the fabrication of a RDF tracking antenna with reduced size, weight and improved low angle tracking accuracy. Set-up time for the antenna should not exceed 10 minutes including leveling and orientation; tear-down time should not exceed 5-7 minutes. Weight distribution for individual components should be commensurate with established lifting capability of a single individual. The accuracy requirements for the antenna should be the same as those specified in the FAMAS ROC, except the accuracy of low angle (6-17°) tracking should be significantly improved. The new RDF antenna will enhance the operational capability of the Field Artillery by providing a system that is more mobile and will reduce march order-time and improve low angle tracking accuracy. This will permit greater flexibility and timely meteorological support to correct artillery fire. Improved low angle tracking is significant in that it will also provide more reliable meteorological data for higher altitude wind sensitive artillery systems. Low angles are indicative of high wind speed which has a great impact on correcting artillery fire. The implementation will be by first replacement. The new antenna will replace the old antenna, one for one, with minor retrofitting being required. A contract will be awarded to the successful bidder to fabricate the antenna. The Product Improvement Program (RDTE phase) will focus on fabrication, testing and evaluation of the most promising candidates and will provide specifications for fabricating the AN/TMQ-31 antenna. Installation of the new antenna will be accomplished by a contractor team at user field locations for 66 units. After FY 1985, the procurement package for the new RDF antenna will be integrated into the procurement of the Meteorological Data Systems, AN/TMQ-31.

4. (U) FY 1983 Planned Program: Complete the AN/TMQ-31 fielding plan, monitor initial production, and conduct First Article Acceptance (FAT) tests at contractor's site. Validation tests of the new RDF antenna will be conducted by TECOM, and operational tests will be conducted by the US Army Field Artillery School. Both tests will be conducted during 4Q1983 and 1Q1984.

5. (U) Program to Completion: The fielding of the AN/TMQ-31 will be completed with Initial Operational Capability (IOC)

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Program Element: #6.47.26.A

Title: Meteorological Equipment and System

DOD Mission Area: #420 - Global Military
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Budget Activity: #6 - Defense Wide Mission Support

In FY 1984 with ten AN/TMQ-31 systems in Germany during December 1983 on conditional IOC. Other meteorological systems required to support the field Army will be accomplished under this project.

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FY 1982 RDTF 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion Continuing	Total Estimated Costs Not Applicable
	TOTAL FOR PROGRAM ELEMENT	2200	1525	1705	2008	Continuing	Not Applicable
M980	TRADOC Studies and Analyses	2200	1525	1705	2008	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEEDED: 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 requiring capabilities not available in-house and not duplicative of other DOD efforts.

C. (U) BASIS FOR FY 1982 RDTF REQUEST: Individual contract efforts will focus on force structuring, missions, requirements, assessment of doctrine, Cost and Operational Effectiveness Analyses, and Cost and Training Effectiveness Analyses for development systems. 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 resource allocations, doctrine, training, and force designs.

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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

D. (U) COMPARISON WITH FY 1981 REQUEST (\$ in thousands):

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	2200	1525	1705	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	2200	1847	2091	Continuing	Not Applicable

The funding level difference in FY 1981 is attributable to the amended budget request, which included a transfer of funds for logistics and personnel studies to the Operations and Maintenance, Army (OMA) Appropriation and to a general Congressional reduction. The decrease in the FY 1982 estimate results from transfer of funds for logistics and personnel studies to OMA and from transfer of funds to higher priority Army requirements.

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

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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

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 Technical Information 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 Technical Information Center. Nonmateriel studies are funded by the Operations and Maintenance, Army appropriation.

H. (U) WORK PERFORMED BY: All work is done under contract. Primary contractors are: 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; and Vector Research, Inc., Ann Arbor, MI. The TRADOC integrating centers (i.e., Combined Arms Combat Developments Activity, Soldier Support Center, and Logistics Center) assist Headquarters (HQ), TRADOC, in formulating the TRADOC study and analyses program. The TRADOC Service Schools, Integrating Centers and HQ, TRADOC monitor the execution of the program by the contractors.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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. The Retail Stockage Policy (Bulk Supplies) study provided a comparative analysis of alternative bulk petroleum retail distribution systems. Methodology was developed for correlating combat effectiveness with logistics support. Cost and training effectiveness analyses were performed in relation to developmental systems to identify preferred training approaches. Another study described sources and recipients of information on the corps battlefield (information requirements by echelon) and format

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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

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requirements. 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 analyses of Army organizations and systems and higher quality study results, were initiated. 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. A new concept of employment for field artillery tactical nuclear forces was initiated along with fire support mission area analyses. Analysis of battlefield spectrum management provides data and management requirements and is oriented toward solving spectrum management problems. Evaluation of reliability, availability, and maintainability (RAM) data by US Army Training and Doctrine Command (TRADOC) is intended to develop a centralized, coordinated approach to development of RAM requirements for developmental Army systems.

2. (U) FY 1981 Program: The intelligence/electronic warfare mission area analyses will define shortfalls in this mission area and identify proposed solutions relative to organization, operations, personnel, and materiel requirements. The air defense mission area analyses will perform similar analyses for the Army's air defense mission and propose solutions. The Army Model Improvement Program will continue for the purpose of developing more responsive models for the analyses of forces and systems capabilities in response to threats. Updated doctrine for nuclear warfare will be developed to reflect the employment of existing and developmental friendly and enemy systems and organizations. The combat support nuclear, biological and chemical mission area analyses will define shortfalls in the Army's defensive nuclear posture and in chemical/biological arenas and propose solutions. The capability of enemy emitters to attack friendly command, control, and communications systems will be analyzed to determine the preferred method(s) to neutralize enemy emitters. A Tactical Fire Direction System (TACFIRE) model will be developed to measure TACFIRE system performance, to provide a basis for software design, and to facilitate user influence on present and future TACFIRE system configurations. Preliminary design and organization of an artillery target integration center will identify sources and types of intelligence information available to artillery systems and develop a proposed approach for integrating artillery target information for efficient and effective use of artillery systems. A cost and training effectiveness analyses will identify the preferred methods for division air defense (DIVAD) gun training and STINGER air defense system training.

3. (U) FY 1982 Planned Program: The Army Model Improvement Program will continue with the purpose of providing more adequate tools for unit and system analyses. The Signal Parametric Analysis of Potential Critical Nodes will provide a new approach for analyzing/processing massive amounts of data to provide rapid identification of high-value targets and a better,

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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

faster, and more efficient indication and warning means for the commander and his staff. The Army air defense command, control, and communications analyses (echelons above division) will provide concepts for effective use of air defense assets, protection of friendly aircraft from engagement by friendly forces, and satisfaction of corps/theater area air defense requirements. An air defense electronic warfare system cost and training effectiveness analysis (CTEA) will derive the preferred training alternative for the system. The antistandoff jammer CTEA will identify the preferred training alternative for that system. An antitactical ballistic missile cost and operational effectiveness analysis (COEA) will define the cost effective measures for countering the tactical ballistic missile threat. A high-energy laser system COEA will assess alternative high-energy laser systems capable of air defense application. The air defense and the battlefield nuclear warfare mission area analyses will define doctrinal, organizational, or materiel shortfalls within those mission areas and identify preferred solutions to problems identified.

4. (U) FY 1983 Planned Program: The FY 1983 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 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; air mobility 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 equipment within Army resource constraints.

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

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5294	4399	5497	6052	Continuing	Not Applicable
D066	Aviation Engineering Flight	5294	4399	5497	6052	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 Army to conduct engineering flight tests required for preliminary airworthiness evaluation of all aircraft, support of required development testing for procurement of new aircraft systems, and airworthiness qualification of certain modifications to existing aircraft. This testing certifies the aircraft as safe to fly, provides the limits of its tactical envelope, and provides technical data for evaluation. 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 used in flight test data reduction. AEFA is collocated with the Air Force Flight Test Facility and provides the Army with the unique capability for performing its own aircraft engineering flight tests.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: FY 1982 funds are required to sustain the engineering flight test activity which supports the planned development and product improvement programs for Army aircraft.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5294	4399	5497	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3959	4689	5199	Continuing	Not Applicable

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Program Element: \$6.52.01.A Title: Aviation Engineering Flight Activity
DOD Mission Area: \$454 - Other Test and Evaluation Support Budget Activity: 76 - Defensewide Mission Support

The FY 1980 increased funding provided for replacement of capital equipment including continued expenditure for a replacement flight test data processing system for data reduction and analysis. The FY 1981 decreased funding reflects the application of general Congressional reductions. These costs represent increased contractual services to include increases in off-site rents, utilities, and communications. Aircraft fuel and spare parts have also significantly increased over prior years. The FY 1981-1982 equipment monies must be used to provide a Realtime Data Acquisition Processing System (RDAPS) and for construction necessary to comply with Occupational Safety and Health Administration (OSHA) directives and requirements. Replacement of this necessary capital equipment was deferred in FY 1979 and FY 1980. The FY 1982 increased funding also reflects the results of higher aircraft fuel costs and civilian pricing indices.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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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

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, procured or modified. This includes New Aircraft Program Development Testing 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 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 for each aircraft. 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 and production guarantees. Approximately thirty test projects are normally accomplished in each fiscal year. This program element also provides for the development and maintenance of an in-flight Helicopter Icing Spray System (HISS) which is used to simulate icing conditions for aircraft qualification tests as well as the conduct of an orientation course which reviews academic fundamentals and flight test techniques for potential Army Aviator Test Pilots who are preparing for entry into the US Naval Test Pilot School.

G. (U) **RELATED ACTIVITIES:** This Activity provides flight test support 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 projects such as development of the XV-15 tilt rotor research aircraft and conduct of external acoustical noise measurements utilizing the YO-3A research aircraft for developing techniques to reduce aircraft detection by reducing ambient noise.

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 1980 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), later designated the UH-60 (BLACKHAWK), and the Advanced Attack Helicopter (AAH), now designated the AH-64. During FY 1979 AEFA worked on ongoing 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 (A6FC) tests, and various OH-58 helicopter 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. Major helicopter test programs for FY 1980 included UH-60A (BLACKHAWK) and CH-47D Preliminary Airworthiness Evaluations (PAE); artificial and natural icing tests in the UH-60A and the CH-47D; icing tests of various ice phobic coatings, and calibration of the Helicopter Icing Spray System (HISS) using an instrumented UH-1H.

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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

2. (U) FY 1981 Program: Major test programs will include AH-64 Engineering Development Test (EDT) IV and V, XV-15 Tilt Rotor Evaluation, Rotorcraft System Integration Simulator and artificial/natural icing evaluation of the UH-60A, AH-64, HH-53, BHT41Z and UH-1H Ice Phobic coatings.

3. (U) FY 1982 Planned Program: Engineering flight test support will include continuation of evaluations on the Advanced Attack Helicopter (AAH) Icing and Development Testing V; Army Helicopter Improvement Program (AHIP) Preliminary Airworthiness and Flight Characteristics Testing; CH-47 D continued Airworthiness and Flight Characteristics Evaluation; UH-60 Standoff Target Acquisition Systems; Evaluation of the Rotorcraft Simulator Integration Systems (RSIS); and flight tests of various rapid deployment and strike force modifications to the UH-60, OH-58, AH-15 and CH 47D.

4. (U) FY 1983 Planned Program: FY 1983 major test programs are expected to include continuation of the Airworthiness and Flight Characteristics Evaluation on the CH-47D, Rotorcraft Simulator Integration Systems (RSIS) Evaluation continuation, and AH-15 with Doppler Flight Tests. Also anticipated are continued tests of rapid deployment and strike force modifications to various fielded aircraft.

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

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.53.01.A

DOD Mission Area: #451 - Major Ranges and Test Facilities

Title: Kwajalein Missile Range

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
	Total for Program Element	98841	127474	140985	153916	Continuing	Not Applicable
D614	Kwajalein Missile Range	98841	127474	140985	153916	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Kwajalein Missile Range (KMR) is a national range whose principal missions are to support Intercontinental Ballistic Missile (ICBM) and Sea Launched Ballistic Missile (SLBM) development and operational testing, Ballistic Missile Defense (BMD) development testing and intelligence data collection. KMR is the only range in the free world where the ICBM/SLBM can be fired to full range in a tactical configuration with sophisticated technical data collection during the terminal portion of the trajectory. These trajectory data are required by the Army BMD program to support BMD systems development, test and validation. Locating BMD experiments on KMR has a synergistic effect since both the strategic offensive and defensive programs benefit. In addition to the support of weapons system development programs, KMR also provides data collected on foreign satellites to the intelligence community.

C. (U) BASIS FOR FY 1982 REQUEST: The FY 1982 funds are required for the continued operation of Kwajalein Missile Range in support of all Services. During FY 82, 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 range sensors to collect technical data in support of BMD experiments being conducted at KMR. These test data cannot be obtained except through use of technical facilities available on and in the geographic location of KMR.

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Program Element: #6.53.01.A

DOD Mission Area: #451 - Major Ranges and Test Facilities

Title: Kwajalein Missile Range

Budget Activity: #6 - Defensewide Mission Support

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST (\$ in Thousands):

RDTE	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
Funds (current requirements)	98841	127474	140985	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	93667	119264	130750	Continuing	Not Applicable

In FY 80, \$1999 thousand was reprogrammed to this project to cover the increase in payments to the Government of the Marshall Islands under the Interim Use Agreement; \$3200 thousand was reprogrammed to offset the impact of the Defense Logistic Agency bulk petroleum price increase; and a reduction of \$25 thousand was imposed for administrative travel. The funding level increase in FY 81 is attributable to the application of higher fuel and funding of modernization and improvement programs at KMR. Increased levels for FY 82 result from higher pricing indices for these same factors than were applied in FY 81.

E. (U) OTHER APPROPRIATION FUNDS

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Costs
Military Construction, Army:						
Funds (current requirements)	2900	6280	3350	5634	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	2900	5740	2034	-	Continuing	Not Applicable

The change in programmed amounts results from additions, deferrals and revised cost estimates. Payments to the Marshallese for past-use of Roi-Namur was added in FY 81 (\$840 thousand), the Live Explosive Storage Facility was deferred to FY 82 (\$360 thousand), and the estimate for the Pollution Abatement Facility was increased (\$30 thousand). In FY 82, increased estimates for the Marine Shop (\$336 thousand), Missile Assembly Building (\$430 thousand) and the Live Explosive Storage Facility (\$190 thousand) account for the change in requirements.

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Program Element: #6.53.01.A

DOD Mission Area: #451 - Major Ranges and Test Facilities

TITLE: Kwajalein Missile Range

Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: KMR is a national range managed and operated by the Army primarily for strategic offensive missile development and operational testing, ballistic missile defense research and development testing, and intelligence data collection on USSR and CPR space launches. Major range users are the Air Force Intercontinental Ballistic Missile (ICBM) program, Navy Sea Launched Ballistic Missile (SLBM) program and Army Ballistic Missile Defense program. The range, located about 8000 KM southwest of Vandenberg Air Force Base, provides the terminal area for Air Force and Navy full-range ballistic missile tests. KMR is the sole range in the free world offering this capability. It is equipped with instrumentation having unique capability to measure performance and accuracy of ballistic missile payloads as they reenter the earth's atmosphere. These offensive missile payloads also provide targets for testing Ballistic Missile Defense (BMD) hardware and technology developed by the Army. Principal range user programs with equipment and personnel on KMR are the BMD Systems Technology Program and the BMD Advanced Technology Program. Data essential to the success of both programs is dependent on the availability of Intercontinental Ballistic Missiles/Sea Launched Ballistic Missiles targeted to impact in the general vicinity of data collection sensors. These data collection sensors include both those of the range user programs and the sophisticated sensors of KMR. Air Force programs include all advanced Ballistic Reentry 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 SLBM programs have included development firings for the Poseidon and Trident. Plans are being made to support testing of the Trident II. In addition to its established role of intelligence data collection on orbiting satellites, KMR will participate in the Air Force Space Detection and Tracking System (SPADATS) to provide early track of new foreign launches.

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 Defense Systems Command, Huntsville, Alabama. Contractors are: Global Associates, Oakland, CA; Kentron International, Dallas, TX; Lincoln Laboratory, Massachusetts Institute of Technology, Lexington, MA; Radio Corporation of America, Moorestown, NJ; CTE Sylvania, Needham Heights, MA; and three other contractors (together totaling \$4,240,000).

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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 (ARPA) developed the Terminal Radiation Experiment (TRADEX) radar system during 1963 and the ARPA Lincoln C-Band Observables Radar (ALCOR) and the ARPA Lincoln Tracking and Instrumentation Radar (ALTAIR) during 1970. KMR has maintained these sophisticated "one of a kind" radar systems at "state-of-the-art" status through the years. These radars and associated data processing equipment have been used successfully in obtaining detailed signature data on ballistic missile payload complexes reentering the atmosphere in the Kwajalein area. These data are essential to the BMD program for development of techniques to discriminate threatening objects in the presence of penetration aids and clutter. These radars were also used to test waveforms and radar techniques that were eventually incorporated into BMD systems. The NIKE-ZEUS and SAFEGUARD BMD programs,

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Program Element: #6.53.01.A

DOD Mission Area: #451 - Major Ranges and Test Facilities

Title: Kwajalein Missile Range

Budget Activity: #6 - Defensewide Mission Support

with full interceptor firings, were completed at KMR. Three additional instrumentation radar systems - two NFS-36 and one TPQ-18 - have been installed to provide trajectory measurement and data collection on multiple reentry vehicles in the terminal area. Sophisticated recording automatic digital optical trackers (RADOTS), as well as fixed optical instruments, are installed on several islands in the atoll to meet terminal metric data collection requirements. Telemetry and impact location radars are installed on appropriate islands to serve user needs. The operations control center is on Kwajalein Island and is supported by a communications 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 facilities are located on Meck Island and Roi Namur Island. During this period, KMR supported Air Force ABRES experimental and developmental firing programs, SAC MINUTEMAN Operational and Training tests, Defense Nuclear Agency (DNA) Special Test Missile firings, and U.S. Navy SLBM programs. Other Army programs supported during this period were the Signature of Fragmented Tanks (SOFT), the Designating Optical Tracker (DOT), and the Systems Technology Reentry Experiment Program (STREP).

2. (U) FY 1981 Program: KMR has 25 major missions forecast. Air Force programs include the Strategic Air Command (SAC) operational testing of MINUTEMAN II and III missiles and the Ballistic Missile Office (BMO) Advanced Ballistic Reentry Systems (ABRES) tests. The Ballistic Missile Defense (BMD) Designating Optical Tracker (DOT) program is scheduled to continue. Modifications will be completed on the ALTAIR radar which will enable data collection on new foreign launches, space object identification, deep space surveillance and satellite catalog maintenance. Prior year budget constraints have contributed to a continuing deferral of both instrumentation modernization and physical plant maintenance projects. The FY 81 guidance allows restoration of the Improvement and Modernization (I&M) program to an acceptable level and provides for a reduction in the backlog of base maintenance and repair projects. 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, procurement of the final Super Recording Automatic Digital Optical Tracker, and development of a Broad Ocean Area scoring system. 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 Petroleum, Oil and Lubricants (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 US concerning land leases will be renegotiated.

3. (U) FY 1982 Planned Program: KMR has 18 major missions forecast. ABRES workload decreases by six missions while the SAC tests continue at the prior year level. The Homing Overlay Experiment (HOE), a BMD Systems Technology Program, is a new test program on the range. The ALTAIR radar will operate 24 hours a day, 7 days a week as a contributing sensor to the AF Space Detection and Tracking System. Funding for I&M continues at the FY 81 level. Projects include replacement of instrumentation controllers, procurement of three Meteorological Sounding Systems, replacement of the Splash Detection Radars, to upgrade telemetry and installation of the Broad Ocean Area scoring system. Base Maintenance and Repair Projects include completion of the electrical feeder cable replacement, initiation of a phased replacement of water supply systems and sewers, and repairs to housing, streets and aircraft taxiways.

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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

4. (U) FY 1983 Planned Program: KMR has 24 major missions forecast. SAC remains at the FY 82 level with the major increase related to the initiation of the MX and Trident test programs. The major I&M project is procurement of a Multi-Target Instrumentation Radar to support high density reentry vehicles in the terminal area.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 96.57.02.A Title: Support of Development Testing
 DOD Mission Area: 7454 - Other Test and Evaluation Support Budget Activity: 76 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	30394	30492	37281	42670	Continuing	Not Applicable
D895	Cold Regions Test Center	4553	5011	5992	6380	Continuing	Not Applicable
D896	Tropic Test Center	2621	2771	3349	3582	Continuing	Not Applicable
D026	Test Design and Evaluation	3030	3829	4329	4830	Continuing	Not Applicable
D127	Meteorological Support to RDTE Activities	4328	5780	6791	8667	Continuing	Not Applicable
D204	Field Smoke Assessment	5132	1286	2383	2252	Continuing	Not Applicable
D575	R&D Field Support Activity	0	0	124	124	Continuing	Not Applicable
D618	Aviation Development Test Activity	6179	6960	7867	8388	Continuing	Not Applicable
D621	United States Army Test Facilities Register	222	148	331	288	Continuing	Not Applicable
D623	United States Army Test and Evaluation Command (TECOM) Instrumentation Development	2830	3092	4094	5499	Continuing	Not Applicable
D625	TECOM Test Methodology	1499	1615	2021	2660	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.

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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 1982 RDTE REQUEST: Provides for continuation of projects to support Army development test and evaluation.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	30394	30492	37281	Continuing	Not Applicable
Funds (as shown in FY 1981 submission) *	29405	32118	41394	Continuing	Not Applicable

\$989 thousand was applied to this project as a result of the approved FY 1980 supplemental Budget Request. \$1626 thousand in FY 1981 funds and \$1836 thousand in FY 1982 funds were reprogramed to higher priority Army requirements. * This line contains FY 1981 estimates for DE95 and DE96 reported in PE 6.58.04.A, DARCOM Ranges/Test Facilities last year.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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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: Ten projects are funded under this program for FY 1981 and FY 1992. The first two projects provide funding for the Cold Regions Test Center (DE95) and Tropic Test Center (DE96). These environmental test centers provide data on effects to DOD materiel and equipment in diverse natural environments. The third project provides funds to the US Army Materiel Systems Analysis Activity (AMSAA) for independent design of development tests and for subsequent independent analyses and evaluations of 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 61 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). 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 the Defense Nuclear agency and the 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, CA. This network provides upper air measurements between 30 and 100 kilometers. 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 (AVNDTA), 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. AVNDTA funding (D618) provides for an aircraft maintenance contract, salaries of civilian test personnel, host support, instrumentation, and supplies. Project D575 provides direct liaison on materiel questions related to test activities conducted at the national training center, Fort Irwin, CA. 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. Project D623 provides for development of instrumentation that is unique to the testing of complex weapon systems at more than one TECOM test activity, which is commensurate with technological advances in materiel developments, and which applies modern technology to cost- and labor-intensive areas to enable more efficient testing at lower manning levels. Project D625 provides for the development and improvement of test methodology for all TECOM test ac-

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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

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.

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 (\$4.4 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 1980 and Prior Accomplishments: The US Army Materiel Systems Analysis Activity (AMSAA) continued 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. Specific materiel items included STINGER air defense missile system, Single-Channel Ground and Airborne Radio System, Lightweight Company Mortar System and Remotely Piloted Vehicles. Meteorological support services were 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 continued at White Sands Missile Range (WSMR). The systematic Army

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Title: Support of Development Testing

DOD Mission Area: #454 - Other Test and Evaluation Support

Budget Activity: #6 - Defensewide Mission Support

Meteorological Rocket Network (MRN) sounding schedule (three per week) also continued. In addition, special event sounding was made to support programs such as the Satellite/Rocketsondes 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 was initiated. The annual Smoke Week was conducted to provide smoke/battlefield debris environment and results of Smoke Week tests were provided to developers of smoke and electro-optic (EO) hardware for use in their programs. Improved instrumentation and methodology was developed and 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) were conducted under obscured (battlefield) conditions. Aviation Development Test Activity (AVNDTA) conducted 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, updated the registration of new or modified test facilities/equipment. Project D623, US Army Test and Evaluation Command (TECOM) Instrumentation Development, efforts included: 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 multitarget 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 were 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).

2. (U) FY 1981 Program: The Cold Regions Test Center and Tropic Test Center will provide the test capability necessary to subject Army materiel to natural environmental conditions required in development testing. Independent test design and evaluation will be expanded to address 55 systems. Meteorological support will be provided to programs such as: Smart Direct Fire Antitank Projectile, Remotely Piloted Vehicles (RPV), and the Tactical Satellite Communication System. The program to modernize meteorological support equipment with emphasis on automation will be continued. Upper air sounding systems will be automated by FY 1983, while modernization of remaining equipment for the meteorological test facility will be completed by FY 1985. The annual Smoke Week will be conducted for the developers of electro-optical (EO) devices. Efforts will be upon improving prediction capability of mathematical models and use of models in lieu of costly flight tests. The Aviation Development Test Activity (AVNDTA) 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); engine modifications; infrared suppressors; T55-L-712 Engine, Model 212 tail rotor hub and blade installation on AH-64; 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 multicomputer data communications, advanced video techniques, electro-optical target development, wideband

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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

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 counter-measures equipment.

3. (U) FY 1982 Planned Program: The Cold Regions Test Center (DE95) and Tropic Test Center (DE96) will continue to provide the test capability necessary to subject Army materiel to the natural environmental conditions required in development testing. Test design and evaluation will address new systems that are programmed for testing and will continue to provide evaluations regarding the adequacy of previously assigned systems. Meteorological support will 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 electro-optical (EO) devices. Emphasis will be upon improving production capability for EO developers. The Aviation Development Test Activity 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 laboratory 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 realtime 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.

4. (U) FY 1983 Planned Program: The Cold Regions Test Center (DE95) and Tropic Test Center (DE96) will continue to provide the Army with test results relative to the man/weapons interface subjected to the natural environmental conditions germane in the arctic and tropic spheres of the world. AMSAA will address new systems that are programmed for testing and provide appropriate evaluation regarding the adequacy of assigned systems. Meteorological support will continue to be provided customers for environmental measurements and meteorological services in support of Army RDTE activities and continue the modernization of the instrumentation and automated programs. The annual Smoke Week will be conducted to provide smoke/battlefield environments for developers of smoke and electro-optic (EO) hardware. US Army Aviation Development Test Activity (USAAVNDTA) will continue to conduct development and production acceptance tests of aircraft systems and components.

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Program Element: #6.57.02.A Title: Support of Development Testing
DDO Mission Area: #454 - Other Test and Evaluation Support Budget Activity: #6 - Defensewide Mission Support

The Test Facilities Register will be continually updated. Instrumentation Development (D623) will continue development for the Live Fire Evasive Target Simulator, Real-Time Chemical Agent Simulator, Laser Designator and many projects in the electromagnetic and vulnerability categories. 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.

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FY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: DE95

Title: USA Cold Regions Test Center

Program Element: #6.57.02.A

Title: Support of Development Testing

DOD Mission: #454-Other Test and Evaluation Support

Budget Activity: #6 Defense Wide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for the operation and maintenance of the US Army Cold Regions Test Center (CRTC), Ft Greely, Alaska (formerly, the US Army Arctic Test Center), a subordinate cold weather environmental test facility of the US Army Test and Evaluation Command (TECOM). Missions include planning, evaluation and reporting on cold regions, mountain and northern environmental phases of development and other types of tests. Also provides support to the Department of Defense, Department of the Army, and the US Army Materiel Development and Readiness Command (DARCOM) for cold regions environmental test and evaluation services. The CRTC maintains and provides a technical base consistent with testing requirements through an improvement and modernization program. Until 30 September 1981, CRTC will be financed by P.E. 6.58.04.A, DARCOM Ranges/Test Facilities. Funding encompasses all fixed and variable expenses, commonly known as a level of effort concept.

B. (U) RELATED ACTIVITIES: Close and continuous coordination exists with other test and evaluation activities, materiel developers, and other elements of the armed services to insure optimum effectiveness of materiel testing while avoiding unnecessary duplication of capabilities.

C. (U) WORK PERFORMED BY: Testing is performed primarily by in-house military personnel and a small number of DA civilians. Many tests require military troops being safaried on temporary duty during the peak testing season.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Major items tested for effects of cold environment on the man/materiel interface include: BLACKHAWK Helicopter, Plastic Fuel Tanks for Trucks, STINGER Guided Missile System, 155mm Smoke Projectile, M43E1 Chemical Agent Alarm, 81mm UX Mortar, and Demolition Kit (XM268). Feasibility studies and surveillance tests were also conducted. Instrumentation modernization emphasized automation and direct data entry. Procurements included: Portable Instrumentation Shelters, Rapid Collection & Analysis of Data hardware, and an Electro-Optical Data Acquisition System.

2. (U) FY 1981 Program: Testing of major items of materiel will continue to be conducted to determine effects of cold environment on the man/materiel interface. The mission is performed through utilization of an in-house capability, including base operations support from the host, and of contractor effort that provides additional services for which no in-house capability exists. Some of the items scheduled for testing are as follows: XM1 Tank, XM825 Smoke Projectile, Artillery

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Project: DE95 Title: USA Cold Regions Test Center
 Program Element: #6.57.02.A Title: USA Cold Regions Test Center
 DOD Mission: #454-Other Test and Evaluation Support Budget #6 Defense Wide Mission Support

Locating Radar AN/TPQ37, XM19810 Agent Alarm, and Portable Decontamination Apparatus. Instrumentation procurements will continue to include items to establish a capability for testing new weapon systems and to provide replacement of the obsolete or uneconomical-to-repair portion of the instrumentation inventory. Items include Portable Instrumentation Shelter, Vehicle Performance Evaluation Equipment, and Data Communications Equipment.

3. (U) FY 1982 Planned Program: Testing of Army materiel will continue to determine the cold weather effects on the man/materiel interface. In-house effort, including base operations support provided by the host, coupled with contractor effort, will balance essential services required to sustain the capability necessary to accomplish the assigned workload. The Cold Regions Test Center will continue to automate the collection of data and provide a quick-look capability. Video technology will be utilized to automate and quantitatively increase the scoring of weapon systems, and digital test instrumentation will be acquired and linked into a network.

4. (U) FY 1983 Planned Program: A level of effort provided by an in-house capability and contractor support will continue to accomplish testing of Army materiel. Modernization efforts toward increasing the capability to make automated measurements of critical evaluation parameters, as well as providing essential instrumentation replacements, will also continue. Planned modernization will expand automated data communications at remote data collection sites.

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

6. (U) Major Milestones: Not applicable.

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

Total						
	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>FY 1983</u>	<u>Additional</u>	<u>Estimated</u>
	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>to Completion</u>	<u>Cost</u>
RDTE						
Funds (current requirements)	4553	5011	5992	6380	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4364	4964	5938	-	Continuing	Not Applicable

\$189 thousand was applied to this project in FY 1980 as a result of the approved FY 1980 Supplemental Budget request and

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Project: DE95

Title: USA Cold Regions Test Center

Program Element: #6.57.02.A

Title: USA Cold Regions Test Center

DOD Mission: #454-Other Test and Evaluation Support

Budget: #6 Defense Wide Mission Support

reflects reprogramming to pay for the actual cost of testing. The funding level differences in FY 1981 and FY 1982 are attributable to the amended budget request and the application of higher inflation and civilian pay pricing indices than were applied last year.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D127

Program Element: #6.57.02.A

DOD Mission Area: #454 - Other Test and Evaluation Support

Title: Meteorological Support to RDTE Activities

Title: Support of Development Testing

Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for atmospheric/meteorological measurements, atmospheric characterization, and professional/technical meteorological consultation/advisory services to Army RDTE activities and to users of the national range at White Sands Missile Range. User-oriented support including personnel, equipment, and supplies is provided at 12 permanent sites and temporary test locations as required in and out of the continental United States. Support provided is critical to high-priority tactical Army-related RDTE of precision-guided/advanced and conventional munitions, conventional and special-purpose weapons, surface/air-launched missiles, and other highly sophisticated equipment and weapons as well as on-range/off-range rocket-firing impact predictions.

B. (U) RELATED ACTIVITIES: 6.11.02.A, Research in Atmospheric Sciences; 6.21.11.A, Atmospheric Investigations; 6.37.41.A, Meteorological Systems-Advanced Development; and 6.47.26.A, Meteorological Equipment and Systems. The Army-operated White Sands Missile Range 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 to avoid duplication of effort.

C. (U) WORK PERFORMED BY : Project is manned by approximately 70% military personnel; therefore, approximately 93% of the work is performed in-house by the Atmospheric Sciences Laboratory (ASL), US Army Electronics Research and Development Command, WSMR, New Mexico. The four primary contractors are: (1) New Mexico State University, Las Cruces, New Mexico; (2) Dynallectron Corporation, WSMR, New Mexico; (3) University of Texas at El Paso, El Paso, Texas; and (4) Lockheed, WSMR, New Mexico.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Meteorological support was provided to an average of 600 projects of 52 Army RDTE activities per year at 12 permanent test sites, for 4 projects at special test sites on a Temporary Duty basis, and 2972 range missions at White Sands Missile Range. Meteorological support furnished included providing complete weather service at Army test sites, providing highly specialized instrumentation and meteorological data collection before, during, and after tests and providing professional consultation. High-priority projects supported included the Mechanized Infantry in Smoke Experiment, Fort Hood, Texas; Electro-Optics; High Energy Laser; Advanced Attack Helicopter; Multiple Launch Rocket System; STINGER; COPPERHEAD; XM1 Tank; and Smoke Aerosol. The Meteorological Modernization Program, initiated in FY 1978,

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Project: #D127

Program Element: #6.57.02.A

DOD Mission Area: #454 - Other Test and Evaluation Support

Title: Meteorological Support to RDTE Activities

Title: Support of Development Testing

Budget Activity: #6 - Defensewide Mission Support

progressed with the acquisition of required hardware/sensors to automate the meteorological data collection at the Central Meteorological Observatories at seven permanent test sites.

2. (U) FY 1981 Program: The highly sophisticated Army weapons/systems in the RDTE arena require continuing update of meteorological capabilities to record, reduce, analyze, and disseminate highly accurate, often unique, parametric measurements in a realtime/near-realtime mode. Additionally, the automated systems necessary for provision of required support to Army RDTE and the national range will be cost effective by replacing present obsolete, labor-intensive systems. Efforts will be initiated for the provision of instrumentation/systems, data collection/reduction analysis, and test range support to the high-priority Testing in Presence of Obscurants (TIPO). Meteorological modernization will continue with the installations of CMO automated data collection and reduction systems; test of prototype Laser Velocimeter that will provide instantaneous realtime update of vertical wind profile (critical for impact prediction to avoid abort/destruct of high-cost test hardware/payloads) in support of rocket launches at the national range; and test of a prototype multitrack, automated upper air sounding system which will increase timeliness and quality of data and decrease manpower requirements. High priority projects to be supported include electro-optics (MEPPEN 80), Meppen, Germany; Near Millimeter Wave (STARTLE), A. P. Hill, VA; High Energy Laser; Multiple Launch Rocket System; CHAPARRAL, HELLFIRE, PERSHING; and Enhanced Cobra Armament Program.

3. (U) FY 1982 Planned Program: Continue to update capabilities to assure required timeliness, quality, and quantity of meteorological services/support to Army RDTE and the national range. Continue development of capabilities for support to the TIPO concept. Continue Meteorological Modernization program with the procurement and fielding of automated remote data collection platforms and advanced upper air sounding systems. High-priority projects to be supported include NATO Smoke Experiment, Central Europe; Close-In Battlefield Test (CIBT), Ft. Hunter Liggett, CA; High Energy Laser; Smoke Aerosol; Precision-Guided Munition; Remotely Piloted Vehicles; Rocket Impact Prediction; and Special-Purpose Weapons.

4. (U) FY 1983 Planned Program: Planned tactical Army-related RDTE requires continuing expansion/update of meteorological services to assure full support to all activities and the national range. Complete the Meteorological Modernization Program with automated CMO, remote site, upper air, and mobile data collection and reduction systems to include communication links with a Meteorological Operations Switching System at White Sands Missile Range, NM. Completed system will provide Army RDTE activities with a direct access, near-realtime data base for both planning and test analysis. Test prototype TIPO support system. High-priority tests to be supported include electro-optics (SNOW II); High Energy Laser; Smoke Aerosol; and tactical Army-related systems/weapons/munitions.

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Project: #D127

Program Element: #6.57.02.A

DOD Mission Area: #454 - Other Test and Evaluation Support

Title: Meteorological Support to RDTE Activities

Title: Support of Development Testing

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):

	1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total FY Estimated Cost
RDTE						
Funds (current requirements)	4328	5780	6791	8667	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4098	5726	8901	-	Continuing	Not Applicable

\$230 thousand was applied to this project as a result of the approved FY 1980 Supplemental Budget request and reprogramming to support the increased workload. The funding level difference in 1981 is attributable to the amended budget request and application of higher inflation and civilian pay pricing indices than were applied last year. The FY 1982 decrease reflects a slowdown in the planned modernization efforts and adjustments in accordance with incremental funding policies.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D618

Program Element: #6.57.02.A

DOD Mission Area: #454 - Other Test and
Evaluation Support

Title: Aviation Development Test Activity

Title: Support of Development Testing

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 (AVNOTA) (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 testing 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. AVNOTA also gathers data to aid in determining component service life, repair parts consumption, 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 DVO2, 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 DVO2. 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 \$4.4 million annually. Current contractual effort is performed by Northrop Worldwide Aviation Services, AL.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Examples of equipment tested 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 included procurement of airborne data acquisition and analysis capabilities.

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Project: #D618
 Program Element: #6.57.02.A
 DOD Mission Area: #454 - Other Test and
 Evaluation Support

Title: Aviation Development Test Activity
 Title: Support of Development Testing
 Budget Activity: #6 - Defensewide Mission Support

2. (U) FY 1981 Program: The level of testing effort is expected to increase approximately 30% over the FY 1980 level. Examples of equipment to be tested are: YAH-64 Advanced Attack Helicopter (AAH) (government Engineering Design Testing (EDT), Physical Teardown Evaluation and Logistics Demonstration and participation in contractor demonstration tests); CH-47D Modernized CHINOOK RAM-D maturity testing; UH-60A BLACKHAWK RAM-D growth, mission flexibility kit and component testing; UH-60A Synthetic Flight Simulator System combined development/operational (DT/OT II); support of comparison test of the OH-6A and OH-58C helicopters; infrared suppressors; tail rotor hub and blade installation on the AH-1S; and tail rotor shaft hangar bearings for the UH-1H. Improvement and modernization of instrumentation will include procurement of calibration equipment, a mobile data reduction system, and photo/video equipment.

3. (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 that has become obsolete and expensive to maintain.

4. (U) FY 1983 Planned Program: Equipment planned for testing includes: the Near-Term Scout Helicopter, evaluation of engineering change proposals and modification work orders on various aircraft, and a "lead the fleet" effort on dynamic components for the YAH-64 AAH. Instruments will be integrated to provide rapid data acquisition and analysis at reduced cost.

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

6. (U) Major Milestones: Not Applicable.

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

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	6179	6960	7867	8388	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	6281	6895	8127	--	Continuing	Not Applicable

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Project: #0619

Program Element: #6.57.02.A

DOD Mission Area: #454 - Other Test and
Evaluation Support

Title: Aviation Development Test Activity

Title: Support of Development Testing

Budget Activity: #6 - Defensewide Mission Support

\$102 thousand in FY 1980 and \$260 thousand in FY 1992 funds were reprogramed to higher priority Army requirements. The funding level difference in 1981 is attributable to the amended budget request and the application of higher fuel, inflation, and civilian pay pricing indices than were applied last year.

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	10426	9911	14638	15143	Continuing	Not Applicable
M541	Materiel Systems Analysis	10426	9911	14638	15143	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 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 the 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 1982 RDTE REQUEST: Complete the analyses and evaluations started in prior years. 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) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	10426	9911	14638	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	10169	14073	15497	Continuing	Not Applicable

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Program Element: #6.57.06.A

Title: Matériel Systems Analysis

DOD Mission Area: #440 - Technical Integration/Studies Analyses Budget Activity: #6 - Defensewide Mission Support

\$257 thousand in FY 1980 funds was reprogramed to this project to provide for accomplishment of essential mission requirements. The decrease in FY 1981 is a result of specific and general Congressional reductions. The FY 1982 estimate has been decreased in order to transfer funds to higher priority Army requirements.

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

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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 mission is to conduct independent systems analyses and effectiveness evaluations of major materiel systems under development. This encompasses assessing the performance, effectiveness, and military utility of existing, developmental, and proposed systems to provide a basis for major decisions concerning their design, development, acquisition, employment, and deployment. AMSAA provides estimates of Army materiel performance for the total spectrum of combat environments to Army agencies as a basis for cost and operational effectiveness analyses, force development studies, and analyses of military materiel requirements. The Advanced Attack Helicopter, XM1 Tank, PATRIOT surface-to-air missile system, Division Air Defense Gun System, Family of Scatterable Mines (FASCAM), 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 development and conducts analyses of the RAM aspects of materiel systems. AMSAA serves as the DARCOM lead activity for the enhancement of materiel survivability by conducting survivability analyses of materiel systems. AMSAA also maintains direct contact with Army materiel users in the field to determine requirements for materiel improvements, 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's executive agent for the Joint Technical Coordinating Group for Munitions Effectiveness (JTCC/ME), which has the responsibility for managing the technical and fiscal aspects of the JTCC/ME program for the Steering Committee in coordination with HQ, DARCOM and the military services. This involves systems analyses and testing in an effort to determine the effectiveness and performance of the operational weapons/munitions systems of all military services. JTCC/ME is financed by program element 6.58.05.A, DOD Munitions Effectiveness and Explosive Safety Standards, Project D620, DOD Munitions Effectiveness. AMSAA also designs development 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 development 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 1980 and Prior Accomplishments: Evaluated the performance of the Cannon-Launched Guided Projectile

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Program Element: #6.57.06.A

Title: Materiel Systems Analysis

DOD Mission Area: #440 - Technical Integration/Studies Analyses Budget Activity: #6 - Defensewide Mission Support

(COPPERHEAD) using a new methodology to assess operation degradations in the battlefield environment in order to project munitions requirements and define optimum employment parameters. Evaluated the survivability of the PATRIOT air defense system from conventional air-delivered munitions, short-range ballistic missiles, and antiradiation missiles (ARM) and defined various options for hardening and recommended the acquisition of an ARM decoy system. Assessed the effectiveness potential of candidate lightweight air defense systems to provide a basis for the development of Army requirements for air defense gun developments in support of the Rapid Deployment Force. Evaluated the Army's chemical warfare defense posture and defined deficiencies in training, doctrine, and materiel for the initiation of improvements in chemical defense and developed critical issues for the Army chemical master plan. Developed the Military Handbook on reliability growth management and coauthored with the Army Management Engineering Training Activity and Office of the Secretary of Defense a primer on the application of statistical concepts for testing and evaluation. Performed reliability and effectiveness analysis of candidate weapons for NATO Small Arms Trials. Conducted joint analysis with Germany on the effectiveness of mines and barriers in support of battalion-, division-, and theater-level defenses. Participated in joint US/Korea analysis of barrier versus minefield effectiveness in defense of Republic of Korea. Analyzed with the US Army Training and Doctrine Command various options for attack of armored vehicles from the vulnerable top aspect and recommended promising weapon concepts for development. Evaluated high-technology testbeds for the armored combat vehicle technology program including potential applications for the Rapid Deployment Force. Participated in the development of the Army Model Improvement Program to develop a hierarchy of standard models for Army analyses.

2. (U) FY 1981 Program: Develop weapon systems performance data base for Army and threat air defense, armor-antiaarmor weapons, artillery weapons, small arms, helicopters, and mine systems in support of the Army Model Improvement Program to provide a consistent basis for major analyses by the US Army Training and Doctrine Command (TRADOC) and other DA agencies. Perform effectiveness and survivability analyses of advanced attack helicopter (AAH) weaponization and analyze various sensor candidates for the near-term scout helicopter to determine optimum sensor package, survivability and target acquisition effectiveness. Based on new methodology developed by AMSAA, evaluate the operational performance of the HELLPFIRE antitank missile in the battlefield environment in support of Army cost and operational effectiveness analyses. Evaluate the effectiveness of the Division Air Defense Gun in engaging threat helicopters in the heavy clutter environment typical of threat helicopters employing antitank guided missiles. Perform studies of biological warfare defensive posture to determine deficient areas and recommend approaches to improve biological defense capabilities. Conduct study of logistical support posture for chemical defense and recommend improvements to chemical defense support (this study will continue into FY 1982). Perform infantry antiaarmor studies to define future weapon system requirements (will continue into FY 1982). Evaluate lethality and survivability of armored combat vehicle technology alternatives. Assess concepts for enhanced artillery firepower to include enhanced self propelled artillery, multiple launch rocket system, and artillery antiradiation projec-

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Program Element: #6.57.06.A

Title: Materiel Systems Analysis

DDO Mission Area: #440 - Technical Integration/Studies Analyses Budget Activity: 26 - Defensewide Mission Support

title. Continue US/Korean assessment of minefield and barrier effectiveness. Development of reliability assessment methodology will continue. Continue support of Army special studies and international panels relative to weapon effectiveness and requirements for interoperability.

3. (U) FY 1982 Planned Program: Continued analyses and evaluation will be required for the general families of weapon systems such as helicopters, air defense, small arms, tank-antitank weapons, artillery, missiles, and communications. Many of these will be carried over from the previous fiscal year in support of the Army Model Improvement Program data base development and due to the continuing nature of many weapon system developments. A major effort in this time-frame will include analyses associated with the integration of battlefield sensors such as the Standoff Target Acquisition System, Remotely Monitored Battlefield Sensor System, and Remotely Piloted Vehicles to assess battlefield intelligence capabilities. Continue to define logistical support requirements for chemical defense. Conduct studies to define nuclear defense posture of the Army and recommend approaches to improve deficient areas. Study logistical support posture in biological defense and define required improper brake improvements. Perform evaluation of Division Air Defense Gun survivability against antiarmor missiles and antiradiation missile attack. Evaluate concepts for command and control of forward area air defenses. Evaluate command and control concepts for employment of advanced attack helicopter and scout helicopter to include interface with advanced target acquisition systems. Continue the assessment of enhanced artillery concepts to include Enhanced Self-Propelled Artillery Weapons Systems, antiradiation projectile, and the corps support weapon. Perform studies of light infantry antiarmor concepts with emphasis on the tank breaker concept and others evolving from close combat mission area analysis. More definitive effectiveness analysis of armored combat vehicle technology candidates will be undertaken. Analyses of both low-energy and high-energy lasers as potential ground combat systems will be conducted. Target acquisition concepts for improved artillery systems and munitions will be explored. Improved methodologies for assessing Army weapons system in the battlefield environment will continue. Continue development of methodologies to predict reliability of developmental systems.

4. (U) FY 1983 Planned Program: Continue independent systems analyses to define performance and effectiveness of Army weapon systems and their threat counterparts in support of major Army analyses and evaluations, with emphasis in the same general areas as in FY 1982.

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

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate 1993	FY 1983 Estimate 2095	Additional To Completion Continuing	Total Estimated Costs Not Applicable
	TOTAL FOR PROGRAM ELEMENT	3242	1542				
D650	Exploitation of Foreign Items	3242	1542	1993	2095	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 response to the expressed needs of the Army Research and Development elements. Program objectives are the transfer of foreign technology to US development projects and to maximize use of foreign innovations, inventiveness, ideas, and technology for the benefit of the US. The program seeks to conserve dollars, save research and development man-hours, and provide information on the latest state-of-the-art of foreign materiel.

C. BASIS FOR FY 1982 RDTE REQUEST: The request for \$1.993 million for Project D650 will support evaluation of thirty 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) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	3242	1542	1993	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	1500	1726	1920	Continuing	Not Applicable

FY 1980 increase due to reprogramming of \$1742 thousand in FY 1980 funds to project D650 for acquisition of additional items for evaluation. The funding level difference in 1981 is attributable to general Congressional reductions. Increased costs shown in FY 1982 are the result of higher fuel, inflation, and civilian pay pricing indices than were applied last year.

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

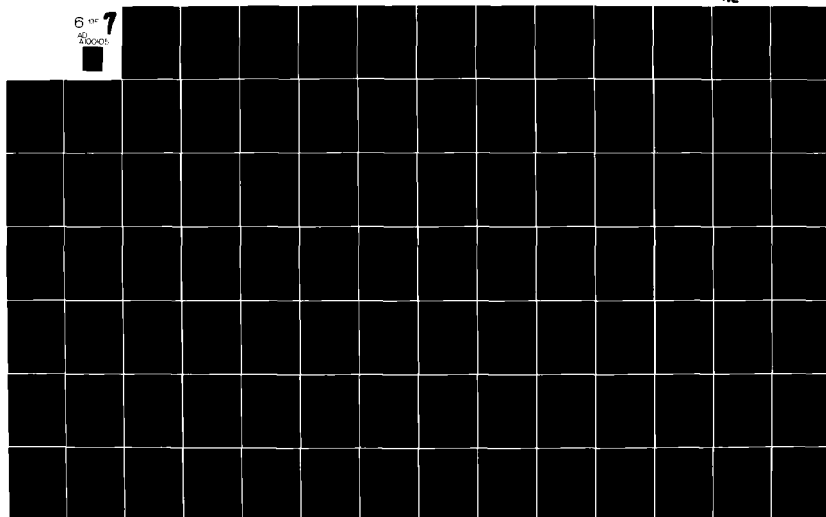
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DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/G 9/1
DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT, TEST AND FVA--ETC(1)
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Program Element: #6.57.09.A

DOD Mission Area: #660 - International Cooperative RDTE

Title: Exploitation of Foreign Items

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 engineering development. Evaluation and exploitation of threat materiel is conducted to assess the state of the art of threat technology. 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 6.51.11.D, Foreign Weapons Evaluation, insures that foreign 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. Program Element 3.13.07.A, Scientific/Technology Intelligence, is used for acquisition of threat items for evaluation and exploitation in support of intelligence activities and long-range threat analyses.

H. (U) WORK PERFORMED BY: 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. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: In FY72, _____ were evaluated. In FY73 evaluation included the _____ Materiel evaluated in FY74 included a _____

Evaluated under DRUID GROVE were components of the _____

tion efforts included the _____

In FY75, eval-
-
-

FY76 continued evaluation of _____

Program Element: #6.57.09.A

DOD Mission Area: #460 - International Cooperative RDTE

Title: Exploitation of Foreign Items

Budget Activity: #6 - Defensewide Mission Support

uated. Evaluation of the
hardness tests of

projects in FY79 were

During FY77, were eval-
was initiated. Completed projects in FY78 were electromagnetic pulse (EMP)

Completed

During FY80, evaluations included

Prior to FY78, evaluation of foreign items, in support of US R&D projects, resulted in documented savings of 40 million dollars in tangible benefits due to transfer of foreign engineering techniques and technology to Army R&D efforts and many instances of savings in developmental time. Recent (FY78 to present) examples of benefits are which advanced US entry in the thin film technology area by 2-5 years, saved estimated \$500K in US R&D funds and incorporated this technology in 7 US R&D projects.

demonstrated the value of incorporation of Central Tire Inflation System (CTIS) and manual locking differ- entials in US designs and the evaluation of NBC protection system avoided hundreds of man-years in false starts. Supported 4 US R&D Projects. resulted in a Value Engineering Proposal (VEP) to adapt

design features to US projects and provide BLACKHAWK, CHINOOK, and CRANE with a previously nonexistent aerial recovery capability, allowed initial procurement savings of \$278,000 and a weight savings of 370 pounds per system and eliminated various design and safety shortcomings. The saddle lug technology, as demonstrated by the

was chosen as the design concept for future attack helicopter weapons racks.

This round demonstrated a lethality 1 to 2 times the lethality of the US round.

Evaluation of this lightweight decontamination unit defined the critical parameters of temperature, pressure, and discharge velocity for effective removal of Chemical/Biological (CB) surface contaminants within the practical field constraints of water supply. The design features of this system have potential for such field uses as personnel bathing, equipment cleaning, aircraft de-icing and support of field hospitals, messes, and maintenance elements.

US inventory has no comparable item. Evaluation results generated a user requirement. Item will be reverse engi- neered for adoption of features (almost exact copy) to US needs. Time and dollar savings not accounted but will be an amount normally attributed to a development of this type. Features of this folding-fin

assembly will be utilized in US design of fin assembly for US 105 multipurpose round. Information gained from projects com- pleted has materially benefited ongoing R&D projects to include approximately forty (40) major projects in various phases of development.

Program Element: #6.57.09.A

Title: Exploitation of Foreign Items

DOD Mission Area: #460 - International Cooperative RDTE

Budget Activity: #6 - Defensewide Mission Support

2. FY 1981 Program: Evaluation and exploitation of foreign materiel will continue. New evaluations include

3. (U) FY 1982 Planned Program: Evaluation and exploitation of foreign materiel technology will continue. The thrust of this program is to contribute to the reduction of dollars and 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 thirty (30) items for exploitation. Targets of opportunity will be considered as the occasion arises.

4. (U) FY 1983 Planned Program: Testing and evaluation of foreign materiel will continue. The FY 1983 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 payoff for the resources invested.

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

FY 1992 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

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

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

Project Number	Title	FY 1990 Actual	FY 1991 Estimate	FY 1992 Estimate	FY 1993 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	36173	39936	44768	52921	Continuing	Not Applicable
DH01	US Army Operational Test and Evaluation Agency (OTEA) Support Equipment	0	0	0	335	Continuing	Not Applicable
DV02	Test Boards	12239	14178	16254	17447	Continuing	Not Applicable
DV03	US Army Training and Doctrine Command (TRADOC) Initial Operational Test and Evaluation (IOTE)	3542	4932	5705	7011	Continuing	Not Applicable
D701	US Army OTEA IOTE	11613	11115	12963	15921	Continuing	Not Applicable
D913	Communications-Electronics User Testing	535	598	400	452	Continuing	Not Applicable
D985	Concepts Evaluation of Materiel	2139	1773	2100	2479	Continuing	Not Applicable
D996	TRADOC Support Equipment	6305	5973	7341	8974	Continuing	Not Applicable
D992	National Training Center Support	0	456	0	502	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to conduct the operational testing of Army systems under development so as to support decisionmaking related to materiel acquisition programs. The program consists of eight projects that 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 issues related to potential Army needs; and for development of instrumentation for TRADOC/OTEA test organizations. The funds programmed each year for each of the three projects that finance operational testing direct costs are equal to the sum of the anticipated costs of conducting the tests scheduled for that year. The funds for these projects are not pro-

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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

portional to the number of tests because the costs of individual tests vary widely (e.g., one test may require ten soldiers for two weeks while another may involve hundreds of participants for six months). The other five projects account for approximately 55% of program element funds and are programed on a level-of-effort basis with some variations (e.g., to develop specific items of instrumentation that provide an effective test capability).

C. (U) BASIS FOR FY 1982 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) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	35373	39036	44768	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	36374	38993	48089	Continuing	Not Applicable

1. The funding level difference in FY 1981 is attributable to the amended budget request, partially offset by the application of a general Congressional reduction.

2. The reduction in the FY 1982 estimate is due to a transfer of funds to higher priority Army requirements and to deferral of \$2 million to FY 1983 through changes in financing practices to facilitate strict adherence to incremental funding policy.

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

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Program Element: 96.57.12.A

DOD Mission Area: 454 Other Test and Evaluation Support

Title: Support of Operational Testing

Budget Activity: 96 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Project DN01, US Army Operational Test and Evaluation Agency (OTEA) Support Equipment, provides for the development of instrumentation and targets utilized to support operational testing of major systems such as tanks and missile systems. Emphasis is placed on more efficient collection of data on the more sophisticated systems under development with particular attention to overcoming recognized inadequacies in the existing instrumentation inventory. Objectives include reduced cost, enhanced realism, and improved test effectiveness. To the greatest extent possible, these objectives are met by exploiting the results of project D986, US Army Training and Doctrine Command (TRADOC) Support Equipment, so that no funds have been required for project DN01 since FY77. Project DV02, Test Boards, provides for the fixed and recurring costs of the TRADOC Test Boards which conduct operational testing (OT) and force development testing and experimentation (FDTE) in support of TRADOC, 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 year of operation with fully staffed test boards. Project DV03, TRADOC Initial Operational Test and Evaluation (IOTE), provides for the direct costs of operational tests of nonmajor developmental materiel prior to production. Project DN01, 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. Project D935, 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 D936, 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, TCATA, formerly Modern Army Selected Systems Test, Evaluation and Review (MASTER), 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 provides for development of an instrumentation system for the National Training Center, Fort Irwin, CA. The instrumentation system will collect and report data on the performance of commanders, staff, and units in a simulated combat environment at the training ranges and will record, consolidate, and process these data.

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

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Program Element: 6.57.12.A

Title: Support of Operational Testing

DDO Mission Area: 8454 - Other Test and Evaluation Support

Budget Activity: 86 - Defensewide Mission Support

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 an Under Secretary of Defense for Research and Engineering (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 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 the US Army Operational Test and Evaluation Agency (OTEA). Operational tests of the acceptability of nonmajor developmental materiel items were 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 were 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. 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, were transferred into PE 6.57.12.A, 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 contractor effort. Contractors include: General Dynamics Corp., San Diego, CA; Jet Propulsion Lab, Pasadena, CA; General Electric, Syracuse, NY; International Laser Systems, Orlando, FL; and MILGO, Inc., Miami, FL. Some instrumentation development is performed in-house by Harry Diamond Laboratories, Adelphi, MD; Naval Postgraduate School, Monterey, CA; US Army Missile Command, Redstone Arsenal, AL, and US Army Tank-Automotive Command, Warren, MI. 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 1980 and Prior Accomplishments: A major effort was begun in FY 1973 to upgrade user test instrumentation including central test data processing, automatic data collection, (moving) target 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 IOTE by US Army Operational Test and Evaluation

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Program Element: #6.57.12.A

DDO Mission Area: #454 - Other Test and Evaluation Support

Title: Support of Operational Testing

Budget Activity: #6 - Defensewide Mission Support

Agency (OTEA) and in FY 1977 for conduct of Initial Operational Test and Evaluation (IOTE) by the US Army Training and Doctrine Command (TRADOC). Approximately 400 IOTE's were conducted and funded by RDTE from FY77 through FY80. The impact of TRADOC concept evaluations has increased each year since the start of the program. Examples of recent evaluations are: parachute inflation assistance device, high-frequency experimentation radio, FM communications radio, closed cycle cooler for Thermal Night Sight, DRAGON tripod, integrated night vision goggles, and recovery vehicle. These efforts proved highly useful in resolving issues related to military application of new or modified equipment.

2. (U) FY 1981 Program: OTEA will conduct 13 operational tests, and TRADOC will conduct approximately 75 operational tests in FY 1981. These include tests of: Squad Automatic Weapon, Advanced Attack Helicopter, VIPER Light Antitank Assault Weapon, Position Location Reporting System, Mortar Locating Radar (AN/TPQ-36), and Division Air Defense Gun System; and of nonmajor systems such as: Small Unit Transceiver, Aerial Railac System (AN/ADR-6), Countermeasures System (QUICK FIX), Combat Boat, Facility Intrusion Detection System, Vehicle-Mounted Road Mine Detector System, XM1 Unit Conduct of Fire Trainer, and Ribbon Bridge Erection Boat. Concept evaluations will include: mountaineering equipment, television system for observation adjustment of indirect fire support, new family of machine and submachine guns, 25mm ammunition box, and rifle thermal sight. Instrumentation, targets, and simulators essential to effective operational testing of systems in a realistic environment, to include threat, will also be developed. Development of a Mobile Automated Field Instrumentation System (MAFIS), begun in FY 1980, will be continued. This system will provide TRADOC with the capability to conduct fully instrumented tests at remote sites where troops and suitable terrain are available, thus reducing the impact of testing on readiness, reducing transportation and travel costs, and increasing realism. MAFIS provides for realtime casualty assessment during force-on-force engagements involving ground-to-ground, ground-to-air, air-to-ground, and air-to-air scenarios. Project D992 provides for development of software packages to operate target arrays and simulation devices for the National Training Center ranges.

3. (U) FY 1982 Planned Program: OTEA plans to conduct 13 operational tests and TRADOC approximately 80 operational tests in FY 1982. Tests include: Multiple Launch Rocket System, High Mobility Weapons Carrier, Standoff Target Acquisition System, Improved 91mm Mortar System, XM1E1 (120mm Gun), Modular Record Traffic Terminal, AH-64 Flight and Weapons Simulator, Portable UHF AM Transceiver, Armor Remoted Target System, Automatic Atmospheric Sounding System and Clothing Decontamination System. Funds programed will support the TRADOC Test Boards and will provide for a major portion of the development of MAFIS with the objective of providing an operational MAFIS in FY 1985. The initial system will accommodate 200 players with an add-on capability.

4. (U) FY 1983 Planned Program: Continue to support operational testing for the US Army. Some tests scheduled to be conducted are: NAVSTAR Global Positioning System Army User Equipment, Remotely Piloted Vehicles, PERSHING II, Fire Support

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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

Team Vehicle System, Secure Digital Net Radio Interface Unit, Tactical Satellite Communications (TACSATCOM) UHF Command and Control Terminal (AN/MSC-65), Aviation Ground Power Unit, Heavy Barrel Machine Gun for Rear Area Combat Operations, Army Training Battlefield Simulation System, and Handheld Digital Communications Terminal. Project DN01 will provide for development of a mobile position location, range timing and event recording system. Project D992 will provide for modification of MAFIS for application to the National Training Center Ranges. MAFIS will provide a fully integrated position location, laser rangefinder, and realtime feedback system for individual soldiers, land vehicles, and aircraft in a dirty battlefield environment.

5. (U) Program to Completion: This is a continuing program. A second phase of MAFIS development will be accomplished aimed at providing enhanced capabilities in FY 1989. This will exploit advanced technology such as millimeter wave radiation to penetrate smoke, fog, haze, rain, and other obscurants on the dirty battlefield. Research will be conducted in techniques for measuring miss distances to more accurately evaluate damage probabilities. More accurate position location and altitude measuring systems will be developed. Expanded memory techniques will be developed for distributed storage at player positions where telemetry data cannot be transmitted to a central data processing position.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DV02

Program Element: #6.57.12.A

DOD Mission Area: #454 - Other Test and Evaluation Support

Title: Test Boards

Title: Support of Operational Testing

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 Aviation 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 also provided clearer separation of development testing and operational testing. The term "operational testing" is 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. The term "development testing" is used to distinguish tests of the acceptability of developmental materiel other than operational tests, prior to commitment to production. Development tests support decisionmaking by demonstrating that design risks have been minimized, that the system will meet its specifications, and that the engineering development process is complete. 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 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, to perform 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 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 this troop support. Approximately 80% of the test boards' workload is devoted to research and development (R&D)-type test and evaluation activities; 60% of this is Initial Operational Test and Evaluation and the other 40% is support of R&D customers and concepts evaluations. The remaining 20% of the boards' workload is devoted primarily to Force Development Testing and Experimentation (FDTE); a small fraction is devoted to support of other non-R&D customers, such as Follow-On Evaluations.

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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

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 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 (PDTE) 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. PDTE 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 1980 and Prior Accomplishments: Organization 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 (PDTE) funded by the Operations and Maintenance, Army

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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

appropriation, and other tests financed by the customers. Additional details are provided above under "Detailed Background and Description."

2. (U) FY 1981 Program: This project continues to provide for the fixed and recurring costs of the eight test boards. The boards continue to 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 1982 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 1983 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	12239	14178	16254	17447	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	12167	14044	15835	Not Shown	Continuing	Not Applicable

(U) FY 1980 funding has been increased slightly to provide for actual costs of operating the Test Boards. The funding level difference in FY 1981 is due to the amended budget request. The FY 1982 estimate has been increased due to the

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Project: #DVO2 Title: Test Boards
Program Element: #6.57.12.A Title: Support of Operational Testing
DOD Mission Area: #454 - Other Test and Evaluation Budget Activity: #6 - Defensewide Mission Support
Support

application of higher fuel, inflation and civilian pay pricing indices than were applied last year.

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DV01

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 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. 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. The following test organizations conduct nearly all TRADOC operational tests:

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), Follow-On Evaluation, 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 DVO2, Test Boards, both in this same Program Element 6.57.12.A.

C. (U) WORK PERFORMED BY: Work is performed primarily by in-house personnel (civilian and military) assigned to the

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Project: #9V01

Title: US Army Training and Doctrine Command (TRADOC)
Initial Operational Test and Evaluation (IOT&E)

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

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 1980 and Prior Accomplishments: Examples of items tested are: Ground-Emplaced Mine Scattering System, Ribbon Bridge Erection Boat, Lightweight Doppler Navigation Subsystem, Small Unit Transceiver, AN/TSQ-10) Automated Ground Transportable Emitter Location Identification System, Combat Vehicle Technology Program, All-15 Fire Control Weapon Subsystem, Mortar Fire Control Calculator, Telephone Signaling Interface unit, and Combat Vehicle Heading Reference System, and Combat Vehicle Crewman's Clothing.

2. (U) FY 1981 Program: TRADOC will conduct approximately 75 operational tests. Examples of tests scheduled include Vehicle-Mounted Road Mine Detector System, Countermeasures System (QUICK FIX), Communications Mode Selector Control, Small Unit Transceiver, Aerial Radiac System (AN/ADR-6), Biological Defense Warning System, Laser Detecting System, Facility Intrusion Detection System, Aviation Night Vision Imaging System, Combat Boot, XM1 Unit Conduct-of-Fire Trainer, and Hardened Tactical Shelters. Support of the Combat Vehicle Technology program will continue.

3. (U) FY 1982 Planned program: TRADOC will conduct approximately 80 tests. Examples of tests scheduled include: Remotely Monitored Battlefield Sensor System, Eye-Safe Simulated Laser Rangefinder, Transportable Helicopter Enclosure, AH-64 Flight and Weapons Simulator, Portable UHF AM Transceiver, Armor Remoted Target System, Clothing Decontamination System, Automatic Atmospheric Sounding System, Division Level Data Entry Device, AN/TSQ-114 TRAILBLAZER, and TACFIRE Tape Validation.

4. (U) FY 1983 Planned Program: Tests planned include: Heavy Barrel Machine Gun for Rear Area Combat Operations, Handheld Digital Communications Terminal, Secure Digital Net Radio Interface Unit, Tactical Satellite Communications, Ultra High Frequency Command and Control Terminal (AN/NSC-65), Aviation Ground Power Unit, Army Training Battlefield Simulation System, Vehicle Magnetic Signature Duplicator, and Portable Mine Neutralization System.

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

6. (U) Major Milestones: Not Applicable.

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Project: #DVO3

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

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	3542	4982	5705	7011	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	5555	5039	6905	Not Shown	Continuing	Not Applicable

FY 1980 funding decreased from last year's estimate as a result of slippage of several operational tests to later fiscal years (e.g., Communications Mode Selector Control, Black Hawk Operational Flight Simulator, Surface Launched Fuel Air Explosive, Transportable Helicopter Enclosure, Aviation Night Vision Imaging System, and Division Level 1 Data Entry Device). The funding level difference in FY 1981 is attributable to a refinement of estimated test costs. The decrease in the FY 1982 estimate is due to refinement of estimated test costs and to deferral of \$400 thousand to FY 1983 through changes in financing practices to facilitate strict adherence to incremental funding policy. The decreases in FY 1980 and FY 1982 funding were made available for transfer to high-priority Army requirements.

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FY 1982 RDT&E 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 programmed 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 1979, 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 RDT&E 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.

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Project: D001

Title: US Army Operational Test and Evaluation
Agency (OTEA) Initial Operational Test and
Evaluation (IOTE)

Program Element: 45-57.12.A

Title: Support of Operational Testing

DOD Mission Area: 4454 - Other Test and Evaluation
Support

Budget Activity: 76 - 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, helicopter 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.

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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):

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	11613	11116	12968	15821	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	11613	11081	14500	Not Shown	Continuing	Not Applicable

The funding level difference in FY 1981 is attributable to the amended budget request, partially offset by the application of a general Congressional reduction. The decrease in FY 1982 funding is due to refinement of cost estimates and to deferral of \$1 million to FY 1983 through changes in financing practices to facilitate strict adherence to incremental funding policy.

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FY 1982 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 (CDEC) 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 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 developing, rebuilding, and reorienting instrumentation systems 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. The 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 and training.

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; US Army Tank-Automotive Command, Warren, MI; 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.

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Project: #0986

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

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Combat Developments Experimentation Command (CDEC) and TRAINOC 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 operational testing and 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; 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); Range Control System, 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 Board; Direct Fire Laser System at TCATA and CDEC for hit/kill simulation; noncommunications and communications threat environment equipment for testing electronic warfare systems at the Intelligence and Security Board; and projectile impact location system and remote control target system at the Infantry Board. During FY 1980, TRADOC, through TCATA, initiated development of subsystems for a Mobile Automated Field Instrumentation System (MAFIS), including navigation, communications, weapons engagement scoring, and data storage and retrieval subsystems. A substantial effort was also made during FY 1980 to provide the test boards with modern instrumentation critical to their operational testing mission (to include completion of several of the projects noted above).

2. (U) FY 1981 Program: Emphasis is being 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. Examples of FY 1981 projects are: continuation of development of threat simulator systems and of threat communications and noncommunications emitters; Telemetry Acquisition System at the Airborne Board; Hit Sensing Telemetry System for Moving Targets at the Infantry Board; Smoke Environment Direct Fire Simulators at CDEC; equipment to establish an adequate communications-electronics test capability at the Communications-Electronics Board; and continuing 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.

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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: 4454 - Other Test and Evaluation Support Budget Activity: 46 - Defensewide Mission Support

3. (U) FY 1982 Planned Program: Approximately half of FY 1982 funding will be devoted to continuation of integrated MAFIS development with the objective of providing an operational MAFIS in FY 1985. The initial system will accommodate 200 players and will have an add-on capability. Other projects include: integration of the range instrumentation at the Air Defense Board; continued development of communications and noncommunications threat systems for testing electronic warfare systems at the Intelligence and Security Board and of threat simulator systems at the US Army Air Defense School; and development of a target system at the Armor and Engineer Board, a data transmission system at the Airborne Board, intervisibility system at CDEC, and a range timing system at the Field Artillery Board.

4. (U) FY 1983 Planned Program: Planned projects include development of equipment such as: MAFIS (which requires more than half of FY 1983 funding, in addition to prior efforts, to permit initial fielding in FY 1985); remote control portable ground targets; data acquisition and processing equipment; smoke-penetrating laser; threat simulator systems; 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. A second phase of MAFIS development will be accomplished aimed at providing enhanced capabilities in FY 1989. This will exploit advanced technology such as millimeter wave radiation to penetrate smoke, fog, haze, rain, and other obscurants on the dirty battlefield. Research will be conducted in techniques for measuring miss distances to more accurately evaluate damage probabilities. More accurate position-location and altitude-measuring systems will be developed. Expanded memory techniques will be developed for distributed storage at player positions where telemetry data cannot be transmitted to a central data processing position.

6. (U) Major Milestones: Not Applicable.

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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

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
RDTE						
Funds (current requirements)	6305	5978	7341	8874	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4365	5922	7541	Not Shown	Continuing	Not Applicable

FY 1980 funding was increased (by reprogramming) compared to last year's estimate to provide for development of urgently needed range control and vulnerability instrumentation for the Armor and Engineer Board and communications and noncommunications threat environment equipment for the Intelligence and Security Board. There is a small increase in the FY 1981 estimate as a result of the amended budget request. The decrease in the FY 1982 estimate is due to deferral of \$500 thousand to FY 1983 through changes in financing practices to facilitate strict adherence to incremental funding policies (partially offset by the application of higher inflation indices).

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.57.15.A

DOD Mission Area: #471 - General Management Support

Title: Defense Systems Management College

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	0	1157	207	207	Continuing	Not Applicable
H199	Defense Systems Management College	0	1157	207	207	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 systems 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 were 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 1982 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.

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Program Element: #6.57.15.A
 IOD Mission Area: #471 - General Management Support

Title: Defense Systems Management College
 Budget Activity: #6 - Defensewide Mission Support

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	0	1157	207	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	900	1243	1393	Continuing	Not Applicable

The FY 1981 submission reflected the creation of this program element, effective in FY 1980. However, this did not occur until FY 1981, and the FY 1980 requirements were funded in program element 6.58.01.A, Programwide Activities. The decreases in FY 1981 and FY 1982, from the previous submission, reflect the completion of the contractor and in-house development efforts on System X II. The current request for FY 1982 is required to continue efforts on selected research project in direct support of the defense acquisition management mission.

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

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Program Element: #6.57.15.A

DDM Mission Area: #471 - General Management Support

Title: Defense Systems Management College

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 systems acquisition program management on a real-world and realtime 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 timeframe will be minimal. The research program of DSMC will be a continuing effort and should be considered as such for future planning.

1. (U) FY 1980 and Prior Accomplishments: Not Applicable.

2. (U) FY 1981 Program: The FY 1981 request was required to complete contractor and in-house development efforts on System X II in anticipation of operational use in FY 1982 and to continue selected research projects in direct support of the defense acquisition management mission.

3. (U) FY 1982 Planned Program: The FY 1982 request is required in order to continue efforts on selected research projects in direct support of the defense acquisition management mission.

4. (U) FY 1983 Planned Program: The FY 1983 request is required to continue to conduct selected research in direct support of the defense acquisition management mission.

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Program Element: #6.57.15.A

DOD Mission Area: #471 General Management Support

Title: Defense Systems Management College

Budget Activity: #6 - Defensewide Mission Support

5. (U) Program to Completion: To be determined.

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FY 1982 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion Continuing	Total Estimated Costs Not Applicable
	TOTAL FOR PROGRAM ELEMENT	48806	51849	68815	65530	Continuing	Not Applicable
MM88-01	Command Headquarters Support	43625	43022	46908	49492	Continuing	Not Applicable
MM88-02	General Administrative Activities	3276	3040	3300	3785	Continuing	Not Applicable
MM88-03	Special Purpose and Automatic Data Processing Equipment	1513	5065	18048	11268	Continuing	Not Applicable
MM88-04	Minor Construction	392	722	559	985	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 classified 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 1982 RDTE REQUEST: The requested program supports continuing requirements for the activities outlined above, at the FY 1981 level of operations. The FY 1982 request reinstates the requirement for a phased program to upgrade the Army's R&D special purpose equipment inventory. Funding for the first increment of an equipment replacement program was programmed for FY 1981. However, an unspecified Congressional reduction of \$5.0 million, and a portion of the general reduc-

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Program Element: #6.58.01.A

Title: Programwide Activities

DOD Mission Area: #471 - General Management Support

Budget Activity: #6 - Defensewide Support

tion for inflation reduced the funding level. This program element is the only source of funds within the RDTE, A appropriation for the purchase and installation of scientific, engineering, and technical special-purpose equipment which is utilized in support of two or more research and development projects. In the past, only minimal funding has been available, and only emergency replacement of inoperable equipment has been accomplished. To perform research and development for the 1980's with equipment of the 1950's and 1960's is self-defeating. Yet this is the position in which the Army finds itself, and where the Army will continue to be until a consistent level of funding is provided which will permit upgrading of the Army's facilities to achieve and maintain state-of-the-art capabilities.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	48806	51849	68815	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	48495	57812	59352	Continuing	Not Applicable

During the execution of the FY 1980 program, only minor changes occurred. The decrease reflected for FY 1981 represents an unspecified Congressional reduction of \$5.0 million to Program Element 6.58.01.A and a portion of the general Congressional reduction for inflation. The requested program for FY 1982 continues to support the activities, as described, at the FY 1981 level, and reinstates the initial increment of a phased program for replacement of the obsolete scientific, engineering, technical, and automatic data processing equipment in the R&D Laboratories. In addition, the FY 1982 request reflects program adjustments as a result of organizational changes at subordinate R&D commands. These changes represent a downward adjustment of \$-3.4 million. The affected commands are US Army Corps of Engineers Headquarters, Tank Automotive R&D Command, Electronics R&D Command, and the Army Missile Command. This decrease is offset by increases to the program for the October 1980 civilian pay raise (+2.7 million); military per diem increase (+\$.200 thousand), and inflation for fuel and other nonpersonnel costs (+\$2.5 million).

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

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Program Element: #6.58.01.A

DOD Mission Area: #471 - General Management Support

Title: Programwide Activities

Budget Activity: #6 - Defensewide Mission 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, 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, the United Kingdom, and Germany; 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 1980 and Prior Accomplishments: Provided funds for operation of US Army Test and Evaluation Command, USA Medical R&D Command, Natick R&D Command, Mobility Equipment R&D Command, Army Research Office, and Standardization Groups. 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.

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Program Element: #6.58.01.A

Title: Programwide Activities

DOD Mission Area: 7471 - General Management Support

Budget Activity: 76 - Defensewide Mission Support

2. (U) FY 1981 Program: Continue support of activities outlined in above paragraph (to include base operations/facility support for Commands).

3. (U) FY 1982 Planned Program: The FY 1982 requested program will provide for continuity of operations of those activities outlined above at the FY 1981 level of effort. In addition, it reinstates the initial increment of a phased program for replacement of the scientific, engineering, technical, and data processing equipment throughout the research and development community. Funds to support an equipment replacement/modernization program were requested in FY 1981, but were reduced by an unspecified Congressional reduction.

4. (U) FY 1983 Planned Program: Continue support of RDTE activities outlined above.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM98-01 Title: Command Headquarters Support
Program Element: #6.58.01.A Title: Programwide Activities
DOD Mission Area: #4/1 - General Management Support Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Resources programmed 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 were 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, and US Army Medical R&D Command.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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, and US Army Medical R&D Command. 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, and Communications R&D Command, and Electronics R&D Command.

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Project: #MM88-01

Program Element: #6.58.01.A

DOD Mission Area: #471 - General Management Support

Title: Command Headquarters Support

Title: Programwide Activities

Budget Activity: #6 - Defensewide Mission Support

2. (U) FY 1981 Program: Continued support of the RDTE activities outlined above.
3. (U) FY 1982 Planned Program: Resources have been programmed 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.
4. (U) FY 1983 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):

	<u>FY 1980 Actual</u>	<u>FY 1981 Estimate</u>	<u>FY 1982 Estimate</u>	<u>FY 1983 Estimate</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
RDTE						
Funds (current requirements)	43625	43214	47468	49492	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	43612	43206	44588	-	Continuing	Not Applicable

The resources requested for FY 1982 will provide for the continuation of the operations as described above. The changes reflected for FY 1980 and FY 1981 are minor and represent reprogramming accomplished within the program element. In FY 1982, program adjustments will be necessary as a result of organizational changes at subordinate R&D commands and their accompanying realignment of functions and associated funding. These adjustments represent a decrease to the program element of ~\$3.4 million. The affected commands are US Army Corps of Engineers Headquarters, Tank Automotive R&D Command, Electronics R&D Command, and the Army Missile Command. However, this decrease is offset by increases to the program for the October 1980 civilian pay raise (+2.7 million); military per diem increase (+\$.200 thousand); and inflation for fuel and other nonpersonnel costs (+\$3.4 million).

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #MM88-03

Program Element: #6.58.01-A

DOD Mission Area: #471 - General Management Support

Title: Special Purpose and Automatic Data Processing Equipment

Title: Programwide Activities

Budget Activity: #6 - Defensewide Mission Support

A. (U) DETAILED BACKGROUND AND DESCRIPTION: This program finances the procurement, installation, and maintenance of scientific, engineering, 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 research and development 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. This project has repeatedly been reduced by unspecified Congressional action to a level of funding which has permitted only emergency replacement of inoperable equipment. The total value of the Army's laboratory general-purpose-use scientific and technical equipment inventory is in excess of \$450 million; most of this equipment was purchased in the era immediately following World War II. A phased plan for replacement and upgrading of this inventory is essential to the performance of the Army's research and development efforts.

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 Research and Development Command, and the Corps of Engineers Research and Development Headquarters.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Provided funding for special-purpose and automatic data processing equipment as outlined in paragraph A above. FY 1980 funds basically supported continuing contracts (such as ongoing equipment rentals) and emergency repairs to aging equipment items.

2. (U) FY 1981 Program: The FY 1981 program level as requested was to support the initial increment of a phased plan for the replacement of obsolete special-purpose equipment throughout the Army's research and development community. However, Congressional action on the FY 1981 request resulted in an unspecified reduction of \$5.0 million. The approved funding level will support ongoing contractual costs (i.e., equipment rental) and allow minimal replacement for urgently needed items as they become inoperable.

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Project: #MM88-03
 Program Element: #6.58.01.A
 DOD Mission Area: #471 - General Management Support

Title: Special Purpose and Automatic Data Processing Equipment
 Title: Programwide Activities
 Budget Activity: #6 - Defensewide Mission Support

3. (U) FY 1982 Planned Program: A report by a recent Department of Defense Laboratory Management Task Force contained, as one of its findings and recommendations, the establishment of a laboratory equipment modernization policy to insure that general-purpose equipment is replaced or acquired in a timely manner. The FY 1982 requested resources will support ongoing contractual efforts and the first increment of a phased plan to replace and upgrade the scientific, engineering, technical, and automatic data processing equipment in the Army's Research and Development laboratories and research facilities. Planned purchases include such items as memory oscilloscopes, signal amplifiers, chromatographs, spectrophotometers, fluorometers, colorimeters, photo analyzers, calibration sensors, cameras, analyzing units, image display systems, environmental testing apparatus, and other specialized engineering, scientific, and medical equipment.

4. (U) FY 1983 Planned Program: Supports continuation of the ongoing contractual efforts and a phased program for replacement of special-purpose and automatic data processing equipment at the Army's research and development laboratories and research facilities.

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

6. (U) Major Milestones: Not Applicable.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	1513	5065	18048	11268	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	1831	10827	10889	-	Continuing	Not Applicable

In FY 1980 resources were transferred, within the element, to Project MM88-02, General Administrative Activities, to support must-fund requirements for pay of personnel and increased requirements created by the currency rate of exchange for the US Army Research, Development and Standardization Groups and support of the Defense Systems Management College, as directed by the Office, Secretary of Defense. The reduction in FY 1981 represents an unspecified Congressional reduction. The requested program for FY 1982 reflects a reinstatement of a phased program for replacement of the obsolete, outdated equipment in the

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Project: #MM88-03

Program Element: #6.58.01.A

DOD Mission Area: #471 - General Management Support

Title: Special Purpose and Automatic Data Processing Equipment

Title: Programwide Activities

Budget Activity: #6 - Defensewide Mission Support

research and development laboratories. This project is the only source of funds within the RDTR,A appropriation for the purchase and installation of special-purpose equipment that is utilized in support of two or more research and development projects. The bulk of the existing inventory was purchased during the 1950 and 1960's, and a phased replacement/modernization program is essential for continued state-of-the-art support to the Army's research and development effort. It is becoming increasingly apparent that the state of obsolescence in the Army's research and development facilities is adversely affecting the Army's ability to attract, recruit, and retain the talented young engineers who are vital to a research and development effort. Failure to provide sufficient funding for a timely replacement program not only will continue to hamper our recruiting ability but also will result in funds designated for other research and development mission projects being utilized to purchase needed equipment, either directly or through below threshold reprogramming action.

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FY 1992 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. (U) RESOURCES (PROJECT LISTING): (\$ in thousands)

Project Number	Title	FY 1990 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	590	645	990	1059	Continuing	Not Applicable
M798	International Cooperative Research and Development	590	645	990	1059	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Covers exchange of research and development technology with key US Allies to reduce duplication of effort and cost. This exchange is carried out through cooperative research and development programs, Data Exchange Agreements (DEA's), and multinational forums; for example, the North Atlantic Treaty Organization (NATO) and the American, British, Canadian, Australian (ABCA) Standardization Program.

C. (U) BASIS FOR FY 1992 RDTE REQUESTS: This program will support travel and expenses associated with participation in international forums, US share of the NATO Industrial Advisory Group (NIAG) activity, and other minor costs associated with international exchange of technology (e.g., negotiation of cooperative research and development projects). US cost share of implementing agreed cooperative projects is borne by applicable Research, Development, Test, and Evaluation program elements.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	590	645	990	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	600	693	914	Continuing	Not Applicable

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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

FY 1980 reduction resulted from preference given to higher priority programs. Congress reallocated funds in FY 1981. Increase in FY 1982 funds is an outgrowth of increased travel costs stemming primarily from greater than expected inflation in fuel, transportation, and per diem costs. FY 80 decrease was the outcome of reprogramming funds of higher Army requirements. FY81 decrease reflects the application of general Congressional reductions. FY82 is the result of a higher inflation index than was applied to the FY81 request.

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

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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, begun, and completed. Besides reducing participant costs, cooperative projects promote equipment standardization or 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) which performs prefeasibility studies associated with NATO exploration of potential cooperative projects.

G. (U) RELATED ACTIVITIES: All Army research and development programs incorporate an investigation and evaluation of comparable non-US NATO systems which are supported by this program. Interservice coordination is carried out for each new program so that the Army, Navy, and Air Force can avoid duplication of effort. Accordingly, many programs become bi- or tri-service. In this way, standardization or interoperability is enhanced, thus assuring maximum use of resources and dissemination of technology.

H. (U) WORK PERFORMED BY: Headquarters, Department of the Army, US Army Materiel Development and Readiness Command, Corps of Engineers, The Surgeon General, and the Army Training and Doctrine Command are principal agencies involved. Military and civilian personnel from these agencies, having specific research and development responsibilities, attend international meetings and forums to discuss ongoing and potential future cooperative research and development projects.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments : In FY 1979 the United States, the United Kingdom, France, and the Federal Republic of Germany signed a Memorandum of Understanding (MOU) for cooperative development for a free-flight, Multiple-Launch Rocket System (MLRS) to satisfy agreed tactical requirements of the four countries. The goals are common logistic and support concepts, coproduction, and future product improvements, e.g., the terminally guided warhead for destruction of enemy armor, which would be jointly produced. In FY 1980 the four governments agreed to a Combined Procurement Plan in furtherance of the MOU to specify the number of launchers and warheads that each country will buy. Other accomplishments were: coordination of British L16A1 mortar testing for possible Army purchase; an MOU with the Federal Republic of Germany for component standardization between XM1 and LEOPARD 2 Main Battle Tanks; the United States, the United Kingdom, France, the Federal Republic of Germany, Belgium, Canada, and The Netherlands began to examine the chief characteristics of future Main Battle

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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

Tank development for the year 2000; US participation in NATO tests resulting in selection of a second NATO standard small arms caliber (5.56mm); completion of joint testing for the French-German ROLAND; establishment of gap-crossing requirements by the United States, the United Kingdom, and the Federal Republic of Germany; the United States, the United Kingdom, France, the Federal Republic of Germany, Italy, and The Netherlands prepared evaluation criteria for the Precision-Guided Munitions (PGM's) applicable to any future PGM development by these countries; the United States and the United Kingdom set up methods and criteria for Armored Fighting Vehicle (AFV) cooperation; the United States, the United Kingdom, France, and the Federal Republic of Germany signed an MOU to explore the feasibility of instituting a cooperative development program for the third generation of Antitank Guided Weapons (ATGW) under which the United States would develop a medium-range, manportable system and the Europeans, a long-range vehicular mounted system; the ABCA Standardization Program formed a new Quadripartite Working Group (QWG) for collaborative training, the objectives of which will be to identify combined exercises in which application of existing Quadripartite Standardization Agreements (QSTAGS) will be evaluated. Coordination of US Army involvement in NATO research and development activities continued.

2. (U) FY 1981 Program: US scientific and technical participation in NATO and in the American, British, Canadian, Australian Program will continue to stress defense equipment standardization or interoperability. The United States and European participants will pursue agreement on joint development of a terminally guided warhead for MLRS. With the United Kingdom, the United States will continue cooperative activities on Armored Fighting Vehicles and Advanced Armor Technology. Working groups will continue to meet as ATGW feasibility studies are developed. As opportunities arise, the United States will negotiate agreements for more efficient use of overall defense resources. Existing bi- and multi-lateral exchange programs will continue.

3. (U) FY 1982 Planned Program: Existing programs will continue. The United States and its European partners will intensify efforts to reach a decision on whether the ATGW family of weapons program is feasible. If so, an MOU to govern the program will be negotiated. It is also expected that Belgium, Denmark, France, the Federal Republic of Germany, Greece, and The Netherlands will review proposals for acquisition of the PATRIOT air defense system. As identified, new cooperative undertakings will be pursued.

4. (U) FY 1983 Planned Program: Existing programs will continue. Consistent with US policy toward cooperation with NATO in materiel production and standardization or interoperability, the Army will respond appropriately. US representation at international panels and conferences will also continue. As Department of Defense, Congressional, and NATO policies on standardization or interoperability further evolve, the program will be reoriented accordingly. Continued efforts to maximize NATO combat efficiency through prudent application of available resources will indicate requirements for expanded Army involvement in International Cooperative Research and Development.

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

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FY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.01.A

DOD Mission Area: #440 - Technical Integration/Studies and Analyses

Title: Technical Information Activities

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	3915	4134	4720	5379	Continuing	Not Applicable
MY11	Modernized Army Research & Development Information System (MARDIS) Support	500	758	659	681	Continuing	Not Applicable
MY29	Integrated Software	260	321	0	0	Continuing	Not Applicable
M720	Technical Information Functional Activities	725	766	956	992	Continuing	Not Applicable
M728	Information Technology	959	647	945	1167	Continuing	Not Applicable
M729	Symposia-Conferences	540	484	621	677	Continuing	Not Applicable
M761	Technical Information Analysis Centers	781	620	931	972	Continuing	Not Applicable
M903	Signals Intelligence/Electronic Warfare						
	Technical Information	150	538	608	690	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element supports projects to improve the Army's mission through continual upgrading of the accuracy, timeliness, availability, and accessibility of scientific, technical, and management information at all levels of Research and Development (R&D) and its management. All Army missions are heavily dependent upon information development, access, validation, and distribution. The Army has the leading Defense Research and Development program in information technology, but the Army capability in information technology still seriously lags behind the state of the art. Recent technological advances will make information science a dominating economic and technical influence in the decade of the 80's. Congress and the Executive Branch have demonstrated their recognition of the growing significance of information processing and the need for this vital management support technology by enacting formal legislation and recently issuing related policy and executive orders. Cost avoidance and savings in terms of men, money, and time

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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

(minutes) can be directly related to enrichment of the information resources base. This program element supports initiatives to improve information derivation, storage, display, transmission, distribution, and interpretation. This program is essential to the Defense Technical Information Center (DTIC) operation and is in no way duplicative of its mission or the mission of Army libraries. Specific examples include analog-to-digital information conversion, information compression to conserve memory storage, high-resolution electronic media displays, and centralized access to remote data banks. An underlying objective is to convert the concept of "Library operation" from "book access" to "information access" to provide the user with direct decisionmaking criteria.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Provide for support to projects to fulfill the provisions of Public Law 94-282. Supports research and development of software and the exchange of software technical information through interagency and industry cooperative interaction. Integrates all Army inputs to the DTIC through five data bases that describe all Army R&D planned activity, ongoing activity, and completed activity using remote terminals for on-line input and access. Supports youth science opportunity and disadvantaged youth science initiative projects nationwide. Supports Army Science Conference to recognize scientists' ongoing accomplishments; partially supports high-technology DOD-chartered information analysis centers, and supports the Army share of the two DOD triservice programs: the Government/Industry Data Exchange Program and the Advisory Group on Electronic Devices. Supports digital processing of analog information such as drawings, X-rays, graphs, and pictures. Supports effort to improve health care delivery through direct on-line patient diagnostics using state-of-the-art information direct and remote access techniques, thus enhancing health care by significantly relieving physician time and availability constraints. Provides support to develop technology transfer to fulfill provisions of Public Law 96-480.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	3915	4134	4720	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3915	4844	5716	Continuing	Not Applicable

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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) Funding level difference in FY81 due to specific and general Congressional reductions. The FY92 reduction resulted from transfer of funds to higher priority Army requirements and from transfer of funding for Integrated Software Research and Development efforts to PG 6.58.98.A, Army Management Headquarters Activity.

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

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Program Element: 16.58.03.A

DOD Mission Area: 4440 - Technical Integration/Studies
and Analyses

Title: Technical Information Activities

Budget Activity: 16 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This is a continuing project, and the overall objectives are relatively unchanging. 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, to provide information in support of technical decisionmaking, and to meet requirements imposed by public law (PL 94-282, PL 96-450). This program is not duplicated by any other project in the Army program and is supportive of DOD activities. It 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. It improves the relevance, accuracy, timeliness, and accessibility of technical information flowing to and from the Army. The program 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, and provides for active technology transfer. Objective number 2 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 3 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 4 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: This program complements Integrated Software Research and Development (ISRAD) activities funded in PE 6.59.98.A, Army Management Headquarters Activities. The Army participates in input and output of the Defense Technical Information Center 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. This program relates also to the National Library of Medicine research program in automatic storage and retrieval of technical information.

H. (U) WORK PERFORMED BY: Approximately one-half of the work has been accomplished under contract by: Applied Data Research Services, Inc., Vienna, VA; Academy of Applied Sciences, Boston, MA; Through Association, Belleville, NJ; Tracor-Jitco, Rockville, MD; Library of Congress, Washington, DC; Harold Davidson, Inc., Fairfax, VA. Projects are monitored/executed by Headquarters, US Army Materiel Development and Readiness Command, Directorate for Development and Engineering, located in Alexandria, VA.

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Program Element: #6.58.01.A

DOD Mission Area: #440 - Technical Integration/Studies
and Analyses

Title: Technical Information Activities

Budget Activity: #6 - Defensewide Mission Support

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: The decision to move Integrated Software Research and Development (ISRAD) activities to PE 65898, Army Management Headquarters Activities, is an economy and efficiency move and will be effective in FY 1982. This will place execution of the ISRAD function in the same area where most of the actual R&D is done for the Army. Twenty-three users were put "on-line" (up from four experimental test sites) with the R&D work unit summary information system, and now 86% of all R&D work unit summaries are put in directly rather than with paper copy. An automated chemical information system was completed and documented. Conference and symposia programs, Junior Science and Humanities Symposia and Science Fairs were continued. Automated procedures were further developed for technical information analysis centers linking them to the Defense Technical Information Center (DTIC) via computer, and a Plastics Evaluation Center was completed, a trial/proposed information analysis center on Geo (combination of geographical/environmental interactions) effects was supported. The continued operations of seven technical information analysis centers were partially supported. This program supported cooperative effort that was extended and transferred to the National Science Foundation (NSF) from 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. Interagency agreements were made to test techniques developed to remotely provide medical diagnostic information. Computer analog information compression techniques to conserve storage requirements were completed.

2. (U) FY 1981 Program: Begin program to move the on-line edit (OLE) system used for collecting R&D work unit summaries originally at remote sites from the contractor to the Defense Technical Information Center (DTIC). Completion of this in FY82 will result in full deployment of the system for the Department of Defense (DOD). Continue to improve the Army scientific and technical information (STINFO) program, integrating individual task efforts (e.g., converting dialogue and graphic and analog (X-rays) information into digital format) into total program needs. Continue conference and symposia program for support of youth science information activities. Continue support to the Government/Industry Data Exchange Program and the Advisory Group on Electronic Devices. Continue development of and complete specialized bibliographies, glossaries and techniques for computer handling of materials information. Continue operations of the R&D work unit summary information system to provide timely, accurate, computer-generated data for R&D program management. Evaluate extending automated information access between technical information analysis centers (TIAC) and DTIC. Continue support of Army TIAC's. Continue to develop technical information for the specialized needs of the Army intelligence community. Effort to establish a test facility and to develop a pilot research effort will go forward to improve Army health care through capability to access medical technical information. Initiate development of an Army-wide Technical Information Management Plan (phase I) to more closely integrate the management of Scientific and Technical Information (STINFO).

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Program Element: #6.59.03.A

DOD Mission Area: #640 - Technical Integration/Studies
and Analyses

Title: Technical Information Activities

Budget Activity: #6 - Defensewide Mission Support

3. (U) FY 1982 Planned Program: Complete transition of the On-Line Edit (OLE) R&D work unit summary information system to DTIC from the contractor and make fully operational at a demonstrated cost savings. Resource information for all levels of R&D management will continue to be improved by automation. The Modernized Army R&D Information System (MARDIS) will continue to provide timely support to RDTE budget formulation, scheduling, and apportionment processes through processing of resources, performance, and milestone data on a near-realtime basis. Technical exchange activities in projects M729, M61, and M903 will continue. Planned program includes continued trial support to Geo effects technical information analysis center and continued improvements to information access to signal intelligence information. It is planned to complete the first phase of the development of an Army-Wide Technical Information Management Plan Phase I. Undertake coordination to implement provision Public Law 96-480 (Stevenson Technology Innovation Act) fostering technology transfer. Continued emphasis will be placed on medical technical information to improve health care and extend physician coverage to include remote information access, teleradiology, and teleconferencing for medical diagnostics.

4. (U) FY 1983 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). Further work is contemplated toward implementing improved medical doctor support especially in view of continued doctor shortages in the military departments. This should lead to increased efficiency and better patient care.

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

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FY 1982 RDT&E 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 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	175057	217397	297653	319215	Continuing	Not Applicable
DE90	Yuma Proving Ground	19282	26831	35553	37449	Continuing	Not Applicable
DE91	Aberdeen Proving Ground	24710	51294	76827	73440	Continuing	Not Applicable
DE92	Dugway Proving Ground	15159	18887	26396	28708	Continuing	Not Applicable
DE93	White Sands Missile Range	106131	108204	134198	138891	Continuing	Not Applicable
DE94	Army Electronic Proving Ground	9775	12181	24679	31727	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 five 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 five 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 and duplication 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. Effective in FY 1981, the High Energy Laser System Test Facility, which in FY 1980 was included in Project DE93 WSMR, will be financed by Project DE97, High Energy Laser System Test Facility. For FY 1982 the High Energy Laser System Test Facility will be financed in P.E. 6.58.06.A. These actions will provide visibility for this facility as a separate DOD test element. Also for FY 1982, Project DE95, Cold Regions Test Center, and Project DE96, Tropic Test Center, are being transferred to P.E. 5.57.02.A, Support of Development Testing. This restructuring will limit P.E. 6.58.04.A projects to those DARCOM Major Ranges and Test Facilities which have been designated as part of the Department of Defense Major Range and Test Facility Base.

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Program Element: #6.58.04.A

Title: US Army Materiel Development and Readiness Command
(DARC/M) Ranges/Test Facilities

DDO Mission Area: #451 - Major Ranges and Test Facilities

Budget Activity: #6 - Defensewide Mission Support

C. (U) BASIS FOR FY 1982 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 include 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. An effort to reduce the test workload backlog at the test facilities will be accomplished through contract augmentation of in-house capabilities.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>Additional To Completion</u>	<u>Total Estimated Cost</u>
RDTE					
Funds (current requirements)	175057	217397	297653	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	180264	245514	282810	Continuing	Not Applicable

FY 1980 funding is decreased for comparability by \$7174 thousand due to the transfer for FY 1982 of Cold Regions and Tropic Test Centers to P.E. 6.57.02.A. FY 1980 funding is increased \$1967 thousand by reprogramming to provide for Advanced Attack Helicopter testing. The funding decrease in FY 1981 arises from comparability transfers of the High Energy Laser Systems Test Facility and the Cold Regions and Tropic Test Centers to other program elements, from specific and general Congressional reductions, and reductions for increased efficiencies. In FY 1982, \$24349 thousand was transferred to P.E. 6.58.06.A to support the High-Energy Laser System Test Facility. FY 1982 funds were then adjusted to reflect increased costs which are the result of higher fuel, inflation, and civilian pay pricing indices than were applied last year; to minimize test slippages arising from a test workload substantially in excess of test capability; and to constrain further deterioration of test facilities.

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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)

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
Military Construction, Army						
Funds (current requirements)	1000	0	0	5000	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4050	4718	0	Not Shown	Continuing	Not Applicable

The FY 1980/1981 MCA project to construct a building to house the Electromagnetic Test Facility at the Electronic Proving Ground has been deferred until FY 1983.

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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 five 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 five projects provide funding to four proving grounds and White Sands Missile Range (WSMR), 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. These ranges 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.

G. (U) **RELATED ACTIVITIES:** These five 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 37 million dollars of contractor effort was expended in FY 1980. Contractors included: Hawthorne Aviation, Charleston, SC; Bell Aerospace Company, Tucson, AZ; Dynallectron, 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 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 Army Forces Command, Ft. McPherson, GA.

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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

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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. FY 1981 Program: The current FY 1981 program reflects a major change from FY80 and prior, wherein P.E. 6.58.04 finances base operations support to Army R&D tenant agencies on a nonreimbursable basis at Aberdeen Proving Ground. This change is a result of decapitalization of Army Industrial Fund under which the proving ground had been operating. Financing support on a nonreimbursable basis will conform to Army policy for host-tenant relations. To effect the increase, other Army R&D projects were adjusted accordingly. FY 1981 program also reflects continued utilization of contractor personnel at Yuma Proving Ground and extension of this effort to other proving grounds to reduce the backlog of testing, replacement of obsolete instrumentation and acquisition of new items to maintain a test capability commensurate with weapon system development.

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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

3. FY 1982 Planned Program: The FY 1982 estimate reflects transfer of High Energy Laser System Test Facility (Project DE97) to P.E. 6.58.06 and the transfer of Project DE95, Cold Regions Test Center, and DE96, Tropic Test Center, to P.E. 6.57.02, Support of Development Testing. The FY 1982 estimate will provide for: constraining further deterioration of the physical plant and reduction in the backlog of deferred maintenance, replacement of obsolete instrumentation, and acquisition of new items necessary to maintain parity with the state-of-the-art in weapon system development, expansion of contractual augmentation of testing capacity initiated in FY80 and FY81, which will enable the US Army Test and Evaluation Command to reduce the backlog of unfinished test workload.

4. (U) FY 1983 Planned Program: The test facilities will continue to provide test and evaluation services to support automotive, missile, and other system developments. Projected workload in FY 1983 will remain comparable to prior year levels and, therefore, will continue to exceed available capability. Efforts will continue to constrain deterioration and reduce backlog of deferred maintenance, improve and modernize ranges and test facilities, and continue to contract with the private sector to augment in-house test capability and thereby reduce the backlog of unfinished test workload.

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

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FY 1982 RDT&E CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE90
Program Element: #6.58.04.A

Title: Yuma Proving Ground
Title: US Army Materiel Development and Readiness Command
(DARCOM) Ranges/Test Facilities
Budget Activity: #6 - Defensewide Mission Support

DOD Mission Area: #451 - Major Ranges and Test

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). Its 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 five projects comprising Program Element (PE) 6.58.04.A. These Projects are managed by the US Army Test and Evaluation Command to preclude duplication. 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 are the US Army Cold Regions Test Center, Fort Greely, AK, and the US Army Tropic Test Center in the Panama Canal Zone, which are funded in PE 6.57.02.A.

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.

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Project: #DE90
Program Element: #6.58.04.A

Title: Yuma Proving Ground
Title: US Army Materiel Development and Readiness Command
(DARCOM) Ranges/Test Facilities
Budget Activity: #6 - Defensewide Mission Support

DOD Mission Area: #451 - Major Ranges and Test

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Yuma Proving Ground (YPG) has developed a highly sophisticated range capability with realtime multitarget 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 FY80, YPG completed 109 tests: 36 R&D, 33 production and post-production, 15 product improvement and malfunction investigations, and 25 others. Major tests of equipment and systems included: development testing of Advanced Attack Helicopter (AAH); Enhanced Cobra Armament Program; ammunition for the Division Air Defense Gun System (DIVAD); a variety of conventional and nuclear artillery ammunition components (8-inch and 155mm) including the Selected Target-Activated Fire-and-Forget (STAFF) weapon system; High-Level Airdrop Technology; Long-Range Surveillance System (AN/USD-502); Global Positioning System (GPS); Aircraft Controlled Exit System (ACES); Surface-Launched Unit Fuel Air Explosive (SLUFAB); Production acceptance and stockpile reliability testing of artillery ammunition, 105mm through 175mm.

2. (U) FY 1981 Program: There are 196 tests scheduled for completion during FY81: 69 Army Research and Development (of which 29 are Major and Designated Nonmajor Systems), 52 Army production and post-production, 34 Army product improvement and malfunction investigations, 6 Navy/Marine Corps and Air Force, and 35 other tests. Test workload will be 49% above projected available capability. The testing backlog will be addressed via significant contractor augmentation, on site, in such critical functional areas as range data acquisition, collation, and reduction, computer software development and interface, ADP system maintenance and conversion, environmental test facility operations/maintenance plus continued high overtime at 12% to 15%. Tests scheduled include: Advanced Attack Helicopter (AAH); desert environmental testing of the XM1 Tank; Multipurpose Submunition Warhead and rocket motor improvements for 2.75-inch rocket system; 155mm Antitank Projectile; Gun Propulsion Technology; Improved 155mm Nuclear Projectile; Type V Airdrop Platform; Aircraft Controlled Exit System; continued testing of Global Positioning System (GPS) Sensor and Long-Range Surveillance system; development testing of AT/TPQ-36 Artillery Locating Radar; continued production acceptance and stockpile reliability testing of artillery munitions of all calibers. Improvement and modernization of instrumentation includes surveillance radar, laser tracker, mobile telemetry data acquisition system, and procurement of a neutron radiographic system to increase the radiographic capabilities necessary to support the technical mission of YPG.

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Project: #DE90
Program Element: #6.58.04.A

Title: Yuma Proving Ground
Title: US Army Materiel Development and Readiness Command
(DARCOM) Ranges/Test Facilities
Budget Activity: #6 - Defensewide Mission Support

DOD Mission Area: #451 - Major Ranges and Test

3. (U) FY 1982 Program: Projected FY82 workload for Yuma will exceed projected available capability by 57%, requiring continued and increased contractor augmentation. Test programs scheduled include: Selected Target-Activated Fire-and-Forget (STAFF) weapons system; continued testing of multipurpose submunition warhead, smoke warhead, and rocket motor improvement for 2.75-inch rocket system; High-Mobility Multipurpose Wheeled Vehicle, NATO field artillery ammunition; large caliber armament systems for armored fighting vehicles; 50,000-lb capacity airdrop system; Ultra-High Level Container Airdrop System; Vehicle Rearm System; Improved smoke projectile, 155mm; development test of several airdrop resupply systems; continued testing of Global Positioning System (GPS) Sensor; production testing of Heavy Expanded Mobility Tactical Truck and other wheeled and tracked vehicles and artillery ammunition. Improvement and modernization of instrumentation includes completion of the surveillance radar system and expansion of position-locating capability and the laser tracker system.

4. (U) FY 1983 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: Sense and Destroy Armor Common Munition; Heliborne Missile (Hellfire); airdrop systems development; production testing of High Mobility Multipurpose Wheeled Vehicle; conventional and nuclear ammunition; continued development testing of STAFF weapon system, Counter-Obstacle Vehicle and NATO field artillery ammunition.

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

6. (U) Major Milestones: Not Applicable.

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Project: #DE90
Program Element: #6,58.04.A

Title: Yuma Proving Ground
Title: US Army Materiel Development and Readiness Command
(DARCOM) Ranges/Test Facilities
Budget Activity: #6 - Defensewide Mission Support

DOD Mission Area: #451 - Major Ranges and Test

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Additional</u> <u>to Completion</u>	<u>Total</u> <u>Estimated</u> <u>Cost</u>
RDTE						
Funds (current requirements)	19282	26831	35553	37499	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	18223	28300	27060	-	Continuing	Not Applicable

\$1059 thousand was applied to this project in FY 1980 by reprogramming from lower priority Army requirements to pay for contractor augmentation, in areas such as data reduction, primarily associated with testing of Advanced Attack Helicopter. The funding level difference in 1981 is attributable to Congressional reductions and reductions for increased efficiency. Increased costs shown in FY 1982 are the result of higher fuel, inflation, and civilian pay pricing indices than were applied last year and of an increase in projected test workload.

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FY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE91
Program Element: #6.58.04.A

Title: Aberdeen 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

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 test 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 radioactive 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 also funds the base operations for the entire installation with funds being transferred from each tenant.

B. (U) RELATED ACTIVITIES: Project DE91 is one of five projects that comprise Program Element (PE) 6.58.04.A. 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 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.

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Project: #DE91
Program Element: #6.58.04.A

Title: Aberdeen 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

C. (U) WORK PERFORMED BY: Work is performed by Department of the Army civilian and military personnel. Telecommunication services are provided by the US Army Communications Command, Ft Huachuca, AZ. Until FY80, only a small portion (about \$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) initiated a contract augmentation plan in FY81 to augment (not replace) the in-house capability.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Prior accomplishments include: Testing of most current and recent Army Combat, Tactical and Support Vehicles on the Hunson 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 measure 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 FY 1980, the materiel testing directorate completed 282 tests: 69 development, 113 production, and post-production; 23 product improvement and malfunction investigations, and 77 other.

2. (U) FY 1981 Program: There are 485 tests scheduled for completion: 180 Army research and development (34 of major and designated nonmajor systems) 173 Army production, 36 Army product improvement, 27 Navy and Air Force, and 69 others. Testing workload will exceed projected capability available by 42%. To minimize the delays in testing, efforts are underway to augment in-house capability with increased contracting for testing services. Two major test areas for which contract augmentation is planned are wheeled vehicle endurance testing and depleted uranium (DU) munitions production acceptance testing. Test programs scheduled include: DU and conventional tank munitions, 90mm thru 120mm; XM1 Tank (105mm) and XM1E1 Tank (120mm); vulnerability testing of the Infantry Fighting Vehicle (IFV); continued production acceptance testing of artillery weapons and armor plate; tactical and support vehicles; general equipment, including generator sets and fuel cell power units, 1.5kW through 100kW; bridging systems; 30-ton Lighter, Air Cushion Vehicle (LACV-30); trailers, semitrailers, and shelters; High Mobility Multipurpose Wheeled Vehicle; and trucks, 1/4 ton through 5 ton. The 200-meter DU range facility is scheduled for completion. Other instrumentation required includes high-speed video cameras to evaluate projectile flight characteristics, upgrade of

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Project: #DE91

Program Element: #6.58.04.A

Title: Aberdeen 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

present test site terminals to store more data and process data quicker as part of the automated data acquisition and processing techniques (ADAPT) Phase II, dedicated instrumentation at the direct fire range to support high-volume workload, and upgrade of data reduction and analysis capability at the main computer facility.

3. (U) FY 1982 Planned Program: Projected testing workload will be 37% above projected capability, requiring continued contractor augmentation. Scheduled tests include: Production test of the Infantry/Cavalry Fighting Vehicles (IFV-CFV) and XM1 Tank; continued development testing of XM1/120mm gun, tank integration and associated munitions; production testing of armor plate and all calibers of artillery weapons systems, tactical and support vehicles, and general fighting vehicles, Division Air Defense Gun Systems (DIVAD), Vehicle Rearm System, and heaters. Instrumentation is required to expand the video instrumentation system for testing and analysis (VISTA) involving infrared television (IR) camera system for IR signature analysis of weapon systems, to provide dedicated instrumentation at the armored vehicle vulnerability range to support high-volume workload, to expand automated data acquisition and processing technique (ADAPT) Phase II with a tracking telemetry antenna system for acquisition of automotive data at remote test courses (Perryman), and to determine elemental composition of materials using an X-ray Spectrometer as an aide in the analysis of materiel failures of weapon systems.

4. (U) FY 1983 Planned Program: Testing of the XM1E1, 120mm gun/conventional/DU munitions/vehicle interface will continue, along with tests of combat vehicle technology, High Survivability Test Vehicle (HSTV); NATO field artillery ammunition; large caliber armament systems for fighting vehicles; and Sensor, Tank Off-Road Mine System (STORMS); continued production acceptance testing of artillery weapons and armor plate, tactical, and support vehicles. Instrumentation is required to expand the video instrumentation system for testing and analysis (VISTA) with a stop action video recording system for automatic weapons scoring, provide dedicated equipment at the small arms range to supporting high-volume workload, expand the data communication link of the ADAPT Phase II to the vulnerability and automotive test ranges, modernize/replace materiel stress analysis and nondestructive test systems to determine structural integrity of ammunitions and weapon components, replace instrumentation cabling with a fiber optics communication system and provide for additional anthropomorphic simulators to support vulnerability testing of tanks and armored vehicles, and upgrade capability in the areas of blast overpressure, weapon recoil, and projectile velocity measurements.

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

6. (U) Major Milestones: Not Applicable.

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Project: #DE91
Program Element: #4.58.04.A

Title: Aberdeen Proving Ground
Title: US Army Materiel Development and Readiness Command
(DARCOM) Ranges/Test Facilities

DOD Mission Area: #551 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

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

	Actual	Estimate	Estimate	Estimate	To Completion	Cost
RDTE						
Funds (current requirements)	24710	51294	76827	73440	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	23297	49600	54598	-	Continuing	Not Applicable

FY 1980 funding was increased compared to last year's estimate by internal reprogramming to provide for increased contractor support to cope with the excess workload. Effective in FY 1981, \$21300 thousand was transferred from 47 projects to consolidate base operations funding. The FY 1981 estimate is increased as a result of the application of higher fuel pricing than was applied last year. The FY 1982 estimate is increased compared to last year's estimate to minimize test slippages arising from a test workload substantially in excess of test capability, to provide for a substantial effort to prevent further deterioration of test facilities, and as a result of the application of higher fuel, inflation, and civilian pay pricing indices than were applied last year.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE92
Program Element: #6.58.04.1

Title: Dugway 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

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 1973, 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 five TECOM installations/activities in this program element. The others, which also operate under the uniform DOD funding policy 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 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 1982, including maintenance and repair of facilities and contract augmentation of testing capability, is estimated at \$8000 thousand.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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 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

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Project: #DE92

Program Element: #6.58.04.A

Title: Dugway 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

and vulnerability assessments; and migration of hazardous substances through soil for the Environmental Protection Agency. Instrumentation acquisitions included items such as: smoke field instrumentation for measuring quantity, quality, and observation 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 1980, Dugway Proving Ground (DPG) completed 49 tests: 19 research and development, one production, five product improvement, and 24 other.

2. (U) FY 1981 Program: Projected test workload is increased by 32% compared to FY 1980. 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. Scheduled test projects include: the biological agent detector alarm, the XM 30 protective mask, 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 toxic environment, technical assessment of foreign biological threat, and development of automatic chemical analyzer. Improvement and modernization will include automation 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).

3. (U) FY 1982 Planned Program: Projected testing workload will be 51% above projected capability, requiring continued and additional contracting with the private sector. Tests scheduled include: Toxicological Projective Outfit; Multispectral Screening System; Deep-Target Incapacitating Weapon; Jet Exhaust-Powered Decontamination System; Tri-Service Chemical/Biological (CB) Investigations; continuing support of Air Force/Navy Cruise Missile testing, 105mm Tank, 81mm Mortar White Phosphorus Smoke Munitions; Riot Control Convoy System; Lightweight Lethal Binary Warhead; Chemical Bomb (BIGEYE); and obscure environmental studies. 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.

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Project: #DE92
Program Element: #6.58.04.A

Title: Dugway Proving Ground
Title: US Army Materiel Development and Readiness Command
(DARCOM) Ranges/Test Facilities
DOD Mission Area: #551 - Major Ranges and Test Facilities Budget Activity: #6 - Defensewide Mission Support

4. (U) FY 1983 Planned Program: Continue to plan for, conduct, report on, and support development and other tests of chemical, biological defense, flame, smoke, and incendiary systems, onsite support to Air Force/Navy Cruise Missile testing, and conduct of Tri-Service CB-related studies. Major tests include: Multispectral Screening Smoke System; 155mm, XM825 Smoke Munition; a family of Training Smoke Munitions; Remotely Piloted Vehicle Screening System; Deep Target Incapacitating Weapon; 155mm Incapacitation Munition; and Jet Exhaust Decontamination Smoke System. Instrumentation acquisition will include smoke field instrumentation for measuring quantity, quality, and obscuration characteristics of newly developed smoke munitions.

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

6. (U) Major Milestones: Not Applicable.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	15159	18887	26396	28708	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	12558	18900	22265	-	Continuing	Not Applicable

FY 1980 funding was increased compared to last year's estimate by internal reprogramming to provide for contractor augmentation to minimize test slippages arising from a test workload substantially in excess of test capability and for critical maintenance and repair of facilities. The FY 1981 decrease reflects the application of general Congressional reductions. The FY 1982 estimate is increased compared to last year's estimate as a result of higher fuel, inflation, and civilian pay pricing indices than were applied last year and to constrain deterioration of test facilities.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE93
Program Element: #6.58.04.A

Title: White Sands Missile Range
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 triservice High-Energy Laser System Test Facility has been established at WSMR. Until this year, funding the establishment of the High-Energy Laser Test Facility has been provided through the WSMR project and/or within PE 6.58.04. To provide visibility and facilitate the management of this important DOD facility, PE 6.58.06 has been established.

B. (U) RELATED ACTIVITIES: Project DE93 (WSMR) is one of five projects comprising Program Element (PE) 6.58.04.A. The other four 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. The High-Energy Laser System Test Facility, located at WSMR, is funded in 6.58.06. 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.

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Project: #DE93
Program Element: #b.58.04.A

Title: White Sands Missile Range
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) WORK PERFORMED BY: Most of the work is performed by Department of the Army civilian and military personnel assigned to WSMR. Contract support to WSMR will total approximately \$36 million during FY 1982. Contractors include RCA, Moorestown, NJ; Physical Science Laboratory, New Mexico University, Las Cruces, NM; IBM, Oswego, NY; Lockheed Engineering Services Division, Houston, TX; International Sensor Systems, Aurora, NE; Vega Enterprises, El Paso, TX; and Dynalectron Corporation, Albuquerque, NM. Government agencies providing support include US Army Communications Command, Ft Huachuca, AZ; Defense Mapping Agency, Washington, DC; US Army Research Office, Durham, NC; Lexington Army Depot, Lexington, KY; US Air Force Special Weapons Test Center, Kirkland and Holloman Air Force Bases, NM; and Department of Commerce, National Bureau of Standards, Washington, DC.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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 II 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 Distant Object Attitude Measurement System, clinetheodolite and camera modernization, and Drone Formation Control System. During FY 1980 WSMR completed 52 tests: 12 research and development; 3 production/post-production, 5 product improvement, and 32 other.

2. (U) FY 1981 Program: During FY 1981, 178 tests are scheduled for completion: 26 Army Research and Development, 10 Army production, 9 Army product improvement, 40 Air Force/Navy Systems (R&D and production), and 93 others. Major test programs include: XM1 tank electromagnetic vulnerability tests, Nuclear Weapons Effects Program, COPPERHEAD, PERSHING II, STINGER, HAWK, the PATRIOT Air Defense System, Air Force and Navy High-Energy Laser Subsystems, NASA sounding rockets, CHAPARRAL, Battery Computer Systems (BCS), and the General Support Rocket System (GSRs). Major instrumentation improvements include replacement of the scientific and engineering computer, modernization of the overall communications system remote control optical instrumentation, range data display system, and secure telemetry.

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Project: #DE93

Program Element: #6.58.04.A

Title: White Sands Missile Range

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

3. (U) FY 1982 Planned Program: Major tests scheduled include: General Support Rocket System (GSRS), PATRIOT, PERSHING II, ROLAND II, STINGER, Improved HAWK, NASA sounding rocket programs, Nuclear survivability tests, High-Energy Laser Subsystems, and Advanced Medium-Range Air-to-Air Missile (AMRAAMS). Instrumentation acquisitions include scientific and engineering computer replacement, replacement of surveillance radars, telemetry improvements, and other high-technology systems to allow WSMR to maintain a viable test capability.

4. (U) FY 1983 Planned Program: WSMR will continue to operate the DOD National Range and provide test and evaluation services to missile and other system development including the High-Energy Laser Systems Program, nuclear weapons effects program, and NASA sounding rocket program. Major tests include ROLAND II, PATRIOT, Division Air Defense Gun System (DIVADS), PERSHING II, Assault Breaker, COPPERHEAD, Improved HAWK, Advanced Medium Range Air-to-Air Missile (AMRAAMS), and numerous Navy and Air Force Missile/Weapon Systems. The most significant instrumentation acquisition in FY83 will be a multitarget tracking radar which will replace several of the existing single-target trackers with increases in efficiency and scheduling flexibility. Other instrumentation includes test equipment and improvements to range data display, computer capability, and communications.

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

6. (U) Major Milestones: Not Applicable.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	106131	108204	134198	138891	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	108640	127400	152461	Not Shown	Continuing	Not Applicable

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Project: #DE93
Program Element: #6.58.04.A

Title: White Sands Missile Range
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

\$2509 thousand in FY 1980 funds was reprogrammed to higher priority requirements within the same program element. In FY 1981 \$14511 thousand was applied to the High-Energy Laser System Test Facility. The remainder of the difference in FY 1981 is attributable to reprogramming to higher priority projects and to reductions for increased efficiencies. In FY 1982, \$24349 thousand was transferred to PE 6.58.06 to support the High-Energy Laser System Test Facility. FY 1982 funds were then adjusted upward to reflect higher fuel, inflation, and civilian pay pricing indices than were applied last year.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE94

Program Element: #6.58.04.A

Title: Army Electronic Proving Ground

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 development and other tests of Army communications, electronic warfare systems and materiel and tactical automated command and control systems. Other missions are to plan, conduct, and report on electromagnetic compatibility (EMC) and electronic countermeasure (ECM) test and analysis, and to operate and maintain three major test facilities: Electromagnetic Environmental Test Facility, System Test Facility, and the Software/Computer Evaluation 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. This mission encompasses development testing of tactical electronic warfare and signal intelligence equipment. An expanded mission is to conduct full performance and interoperability tests of command, control, communications and intelligence systems (C3I) in a threat environment. 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, 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 evaluation 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. 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

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Project: #DE94
Program Element: #6.58.04.A

Title: Army Electronic Proving Ground
Title: US Army Materiel Development & Readiness Command
(DARCOM) Ranges/Test Facilities
Budget Activity: #6 - Defensewide Mission Support

DOD Mission Area: #451 - Major Ranges and Test
Facilities

Test Facility and the Systems Test Facility by Bell Aerospace Company, Tucson, AZ. Contract support for FY 1982 including maintenance and repair of facilities and augmentation of in-house capability is estimated at \$4000 thousand.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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 AqUHA drones at long range. The first increment of C3I instrumentation was procured to develop an initial capability to test automated battlefield systems. 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 1980, the Electronic Proving Ground completed 114 tests: 50 research and development; 12 production, 3 product-improvement and 49 other.

2. (U) FY 1981 Program: The testing capability will be augmented via increased contractor effort and overtime. There are currently 166 tests scheduled: 80 Army Research and Development, 21 Army Production, 3 Army Product Improvement, 13 Navy/Air Force, and 49 Others. Major tests include Facility Intrusion Detection System, Digital Transmission Evaluation Program, Remotely Piloted Vehicle (RPV), Electromagnetic Compatibility Analysis on Patriot and Roland Missile Systems, Tactical Fire Direction System (TACFIRE), Field Artillery Meteorological Acquisition System, Integrated Inertial Navigation System, Joint Tactical Microwave Landing System, and Tactical Control and Analysis Center. Emphasis will continue to be placed on instrumentation acquisition required to test C3I systems (approximately \$10,000 thousand). Procurement will also be initiated to further improve instrumentation radars and the automation of bench test facilities, both directed toward alleviating the excess workload problem by increasing test efficiency and effectiveness without additional personnel.

3. (U) FY 1982 Planned Program: Tests include Facility Intrusion Detection System, Remotely Piloted Vehicles, VHF Multi Channel Tactical Satellite Communications Terminal, ROLAND Air Defense System, Integrated Inertial Navigation System, and Division Technical Control and Analysis Center. The improvement and modernization thrust will continue to be directed

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Project: #DE94

Program Element: #6.58.04.A

Title: Army Electronic Proving Ground

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

toward the capability to test C3I systems, while maintaining USAEPG's technological base for other commodity areas. TEMPEST testing will be automated, and modern identification friend-or-foe (IFF) test capability will be acquired.

4. (U) FY 1981 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 testing electronic countermeasure vulnerability, improved space position capability and for testing C3I systems.

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

6. (U) Major Milestones: Not Applicable.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE-1/ Funds (current requirements)	9775	12257	25065	31727	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	10267	13200	17016	Not Shown	Continuing	Not Applicable

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Project: #DE94
Program Element: #6.58.04.A

Title: Army Electronic Proving Ground
Title: US Army Materiel Development & Readiness Command
(DARCOM) Ranges/Test Facilities
Budget Activity: #6 - Defensewide Mission Support

DOD Mission Area: #451 - Major Ranges and Test
Facilities

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Other Appropriations ^{2/}						
Military Construction, Army						
Funds (current requirements)	0	0	0	5000	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	418	3723	0	Not Shown	Continuing	Not Applicable

1/ \$492 thousand in FY 1980 funds and \$943 thousand in FY 1981 funds were reprogrammed to higher priority Army requirements. The funding level difference in FY 1982 is due to a concerted effort to provide a capability to conduct interoperability tests of command, control, communications, and intelligence systems. Increased costs shown in FY 1982 also reflect the result of higher fuel, inflation, and civilian pay pricing indices than were applied last year.

2/ The FY 1980 MCA project to construct a building to house the electromagnetic test facility has been deferred until FY 1983 due to higher priorities.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.05.A

Title: DOD Munitions Effectiveness and Explosive Safety Standards

DOD Mission Area: #449 - Technical Integration/Studies and Analyses

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1990 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion Continuing	Total Estimated Costs Not Applicable
	TOTAL FOR PROGRAM ELEMENT	5461	6164	7243	8510		
D620	DOD Munitions Effectiveness	4670	5588	6572	7570	Continuing	Not Applicable
M857	Explosive Safety Standards	791	776	671	940	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 1982 RDTE REQUEST: Project D620 (DOD Munitions Effectiveness) will continue to update and revise existing manuals and to add new manuals as vulnerability data, weapon characteristics and delivery accuracy become available. Specifically air-to-surface effectiveness against POL refineries, synthetic ammonia plants, port facilities, airfields, thermal power plants, communication sites, buried POL and elevated pipelines will be published. The surface-to-surface group will evaluate the GAU-8 gun in a ship-to-ship role, add COPPERHEAD data to appropriate pamphlets, complete effectiveness studies of the 5-inch/54 MK68 and MK96 against Soviet ships, and start work on XM2/XM3 pamphlet, armor pamphlets (M60A3 and XM1), artillery pamphlets (M110A1 and M198 howitzers), and evaluate TOW effectiveness against helicopters. The antiair group will work on Roland air defense manual, 5-inch/54 MK42 Mount/MK 58 Mod 16 effectiveness manual, AIM-54A lethality envelopes,

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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

F-19 gun sight model, print take-off assessment of Flogger B, AIM-7F model comparison, and F014 expected hits and probability to kill envelopes. Vulnerability of the following targets will be assessed: underground facilities, M194 SP 122mm Gun, URAL-375 truck with ammunition and POL cargoes, RTR-60pb and BRDM-II personnel carriers to fragments and armor-piercing projectiles, buried ammunition storage bunkers, communication sites, mobile electric power units, dams, M113 Armored Personnel Carrier, and the BMD. Combined dynamic effects tests and analysis will be completed as well as tests against the hardened artillery site. The Combat Data Information Center will be supported. The Smoke Obscuration manual will be updated. The revision of the Red on Blue manual will be started. Project M857 supports the Department of Defense Explosives Safety Board through determination of the fragment hazard from large stocks of stored ammunition, development of a hazard classification scheme for fragment-producing weapons, and testing to evaluate thermal effects from combustible, nondetonating munitions.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5461	6364	7243	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	5461	6835	7362	Continuing	Not Applicable

Decrease in FY81 is attributable to the application of general Congressional reductions. The FY82 funding difference is partly due to a leveling of the program based on the FY81 reduction and a reduction based on an analysis of prior year program execution in accordance with incremental programming policy.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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Program Element: 6.59.05.A

Title: DOD Munitions Effectiveness and Explosive Safety Standards

DOD Mission Area: 449 - Technical Integration/Studies and Analyses

Budget Activity: 76 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Project D620 (DOD Munitions Effectiveness): The Joint Technical Coordinating Group, Munitions Effectiveness (JTCC/ME) was established by Joint Chiefs of Staff Directive in 1963 and manages the effort conducted under this project. The JTCC/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 anti-air munitions/weapons systems; investigations in aircraft attrition; and supporting efforts in target vulnerability and survivability, selected systems effectiveness, and battle-damage assessment. Ad hoc tasks are undertaken as required to assist in the resolution of data deficiencies relative to existing munitions/weapons and their effectiveness. Project M857 provides for full-scale and subscale testing and supporting analysis directed toward improvement of triservice ammunition and explosives safety standards, published by the DOD Explosives Safety Board (DDESB) as DOD Standard 5154.48. 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. Beginning in FY 1981, Project M857 is coordinative, plans for follow-on testing of earth-covered magazine and operating building construction with the Navy Civil Engineering Laboratory program of explosive facilities design improvements.

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

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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

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; Armament Systems, Inc., of Anaheim, CA; Boozo-Allen Applied Research, Bethesda, MD; Denver Research Institute, Denver, CO; Approximately 80 percent of Project M857 work is accomplished by the following DOD organizations: Navy Civil Engineering Laboratory, Port Hueneme, 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.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: From 1961 to the present time Project D620 (DOD Munitions Effectiveness) has produced Joint Munitions Effectiveness Manuals (authenticated by the Services) on air-to-surface (JMEM/AS), surface-to-surface (JMEM/SS) and antiair (JMEM/AA) munitions as well as manuals addressing weapon accuracy, characteristics, vulnerability, methodology, and joint testing procedures. Realistic validation of analyses was obtained through comparisons with battle data obtained during Vietnam and Mideast conflicts. Battle damage data are stored and available for analyses at the Combat Data Information Center (CDIC). A program to assess environmental effects on weapon effectiveness was completed in 1975. Studies on vulnerability of US forces to chemical and biological attack and decontamination requirements in a chemical warfare environment were also completed in 1975. Detailed vulnerability data were published in 1967 and is continually updated on foreign armored vehicles, field and antiaircraft artillery, airfields, field fortifications, bridges, land and water transportation, missile sites, radars, supply depots and dumps, and various complex industrial targets. From 1977 to 1980 (under severely reduced funding) vulnerability data have been increased in every category, and tests are underway to define bomb reliability and effectiveness against selected hard targets and clarify dynamic effects of shaped charge weapons against lightly armored vehicles. Air-to-surface effectiveness manuals for helicopters and the A-10 aircraft were prepared. Effects data were published on laser-guided bombs and the new CBU-15 against Soviet ships. Antiair effectiveness manuals were completed for the Vulcan, Phalanx, 5-Inch/54, 76mm, and Improved Hawk air defense systems and for the AIM-7E2 and AIM-7F air-to-air systems. Launch envelopes for the AIM-9H were published. Surface-to-surface effectiveness manuals on the 5-Inch/38, 8-Inch/55 naval guns and nonnuclear Lance were published. Revisions and updates to existing manuals on 4.2-inch mortar, 105mm, and 8-inch howitzers; Honest John rocket, 5-Inch/38 naval gun; M60A1 tank; and Infantry direct fire weapons were produced. A surface-to-surface Basic Manual was completed and published. The first visual target acquisition manual

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Program Element: #6.58.05.A

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was printed. Lethality and vulnerability data were provided in support of the DOD Joint Test of Tactical Aircraft Effectiveness and Survivability in Close Air Support Antiarmor Operations (TASVAL), and detailed analyses of the DOD Air Intercept Missile & Air Combat Evaluation Tests (AIMVAL/ACEVAL) were completed. An illumination effectiveness manual was produced. A first-cut manual on Red weapon effectiveness against Blue targets was published. Beginning in 1980, the task of providing all future estimates of weapon effects against Soviet ships was undertaken. Effort is underway to identify weapon effects data available and critical voids for vulnerability/survivability of all priority Soviet/Warsaw Pact targets to support an expanded Red on Blue manual. Project M857 completed six tests in the arctic testing 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. Model experiments have been conducted to quantify the suppression blast by the earth cover of storage magazines, and to determine blast leakage into hardened aircraft shelters from explosions in storage magazines. Work was completed on the initial phase of a program to evaluate the thermal effects from ammunition fires.

2. (U) FY 1981 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. 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 task in this area. A data base for hard target ricochet 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 Arctic testing. 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.

3. (U) FY 1982 Planned Program: Project D620 will continue to maintain and update existing manuals, add new target/weapon combinations, and maintain the Combat Data Information Center. Specifically, the air-to-surface group will add new target acquisition under adverse conditions, add the T-72 tank as a target in the Visual, Radar, A-10, and Helicopter manuals, reevaluate the chemical effectiveness methodology, complete a revision of the Weapon Characteristics Manual and provide Red on Blue inputs. The surface-to-surface group will compute effectiveness of the Harpoon Missile, COPPERHEAD, 76mm MK92/MK75 and MK68 Mod 16; assess delivery accuracy of the Navy Guided Missile and the XM1 tank; add a ship target to the

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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

Navy pamphlets; start work on a new indirect fire methodology; produce a small arms manual; and complete updates of the Basic Manual. The anti-air group will complete pamphlets for Roland, Chaparral, and AIM-9L (helicopter-launched), calculate Phoenix lethality, add the SS-N-12 and SS-N-20 as targets, and start investigation of focused blast effects on aircraft. Vulnerability assessments will be made on specific radars, bridge-laying tank, SA-4 missile launcher, seaport general cargo-handling facilities, hydroelectric plants, selected Blue targets, and propagation of high-order explosive effects in stored ammunition. Work will continue on adding realistic battlefield elements to the effectiveness manuals. The Obscurants Effectiveness manual will be updated by adding chapters on burning vehicles, smoke pots, and gun flash/smoke. The revised Red on Blue manual will be published, and updates to it will begin. Project M957 will complete confirmatory tests of fragmenting ammunition to validate fragmentation theory. Initiate development of a hazard classification scheme for fragment-producing weapons. Evaluate response of exposed structures and materials to thermal effects from ammunition fires. Also, a revised edition of TM 5-1390 will be circulated for coordination.

4. (U) FY 1983 Planned Program: Project D620 will continue to conduct munitions effectiveness and analyses to assist all Services in developmental and program decisions. Project M857 will conduct tests of fragmenting ammunition as necessary to fill gaps in the data base. There will be continued development of a comprehensive fragment hazard classification scheme. Thermal effects studies to characterize source-environment and output-target interactions will be conducted.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D620

Program Element: #6.58.05.A

DOD Mission Area: #440 - Technical Integration/
Studies and Analyses

Title: DOD Munitions Effectiveness

Title: DOD Munitions Effectiveness and Explosive Safety Standards

Budget Activity: #6 - Defensewide Mission Support

A. (U) **DETAILED BACKGROUND AND DESCRIPTION:** Project D620 (DOD Munitions Effectiveness): The Joint Technical Coordinating Group, Munitions Effectiveness (JTCC/ME) was established by Joint Chiefs of Staff Directive in 1963 and manages the effort conducted under this project. The JTCC/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 project is related to M857. These two projects provide a single program 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, the Technical Systems Laboratory at Aberdeen Proving Ground, MD; US Army Missile Command, Redstone Arsenal, AL; the Army Research and Development Command, Dover, NJ; US Army Armament Materiel Readiness Command, Rock Island Arsenal, IL; the Army Research and Development Laboratory, Eglin Air Force Base, FL; Air Force Flight Dynamics Laboratory, Dayton, OH; 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,

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Project: #D620

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DOD Mission Area: #440 - Technical Integration/
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Budget Activity: #6 - Defensewide Mission Support

CO, and Albuquerque, NM; Armament System, Inc. at Anaheim, CA; Booz-Allen Applied Research, Bethesda, MD; Applied Research, Bethesda, MD; and the Denver Research Institute, Denver, CO.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: From 1961 and continuing to the present time, project D620 (DOD Munitions Effectiveness) has produced Joint Munitions Effectiveness Manuals (authenticated by the Services) on air-to-surface (JMEM/AS), surface-to-surface (JMEM/SS) and anti-air JMEM/AA munitions as well as manuals addressing weapon accuracy, characteristics, vulnerability, methodology, and joint testing procedures. Realistic validation of analyses was obtained through comparison with battle data obtained during the Vietnam and Mideast conflicts. Battle damage data are stored and available for analyses at the Combat Data Information Center (CDIC). A program to assess environmental effects on weapon effectiveness was completed in 1975. Studies on vulnerability of US forces to chemical and biological attack and decontamination requirements in a chemical warfare environment were also completed in 1975. Detailed vulnerability data were published in 1967 and are continuously updated for foreign armored vehicles, field and antiaircraft artillery, airfields, field fortifications, bridges, land and water transportation, missile sites, radars, supply depots and dumps, and various complex industrial targets. From 1977 to 1980 (under severely reduced funding) vulnerability data have been increased in every category, and tests are underway to define bomb reliability and effectiveness against selected hard targets and clarify dynamic effects of shaped charge weapons against lightly armored vehicles. Air-to-surface effectiveness manuals for helicopters and the A-10 aircraft were prepared. Effects data were published on laser-guided bombs and the BUI against Soviet ships. Anti-air effectiveness manuals were completed for the Vulcan, Phalanx, 5-inch/54, 76mm and Improved Hawk air defense systems, and for the Air Intercept Missile (AIM-7E2 and 7F) (Sparrow). Launch envelopes for the AIM-9 (Sidewinder) were published. Surface-to-surface effectiveness manuals on the 5-inch/38, 8-inch/55 naval guns, and nonnuclear Lance were published. Revisions and updates to existing manuals on 4.2-inch mortar; 105mm, 155mm, and 8-inch howitzers; Honest John rocket; 5-inch/38 naval gun; M60AI tank; and Infantry direct fire weapons were produced. A surface-to-surface Basic Manual was completed and published. The first visual target acquisition manual was printed. A DOD/DOR-directed study on insensitive high explosives/propellants was completed. A smoke primer and an obscuration effectiveness manual were produced. Lethality and vulnerability data were provided in support of the DOD Joint Test of Tactical Aircraft Effectiveness and Survivability in Close Air Support Antiarmor Operations (TASVAL) and detailed analyses of the DOD Air Intercept Missile & Air Combat Evaluation Tests (AIMVAL/ACEVAL) were completed. An illumination effectiveness manual was produced. A first-cut manual on Red Weapon effectiveness against Blue targets was published. Beginning in 1980 the task of providing all future estimates of weapon effects against Soviet ships was undertaken. Effort is underway to identify weapon effects data available and critical voids for vulnerability/survivability of all priority Soviet/Warsaw Pact targets to support expanded Red on Blue manual.

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Project: #D620

Program Element: #6.58.05.A

DOD Mission Area: #440 - Technical Integration/
Studies and Analyses

Title: DOD Munitions Effectiveness

Title: DOD Munitions Effectiveness and Explosive Safety Standards

Budget Activity: #6 - Defensewide Mission Support

2. (U) FY 1981 Program: Project D620 (DOD Munitions Effectiveness) will continue to update and revise existing manuals and to add new manuals as vulnerability data, weapon characteristics, and delivery accuracy become available. Specifically, air-to-surface effectiveness against POL refineries, synthetic-ammonia plants, port facilities, airfields, thermal power plants, communication sites, buried POL and elevated pipelines will be published. The surface-to-surface group will evaluate the CAU-8 gun in a ship-to-ship role, add COPPERHEAD data to appropriate pamphlets, complete effectiveness studies of the 5-inch/54 MK68 and MK86 Naval Guns against Soviet ships and start work on XM2/XM3 Infantry Fighting Vehicles pamphlet, armor pamphlets (M60A3 and XM1), artillery pamphlets (M109 and M198 howitzers), and evaluate TOW missile effectiveness against helicopters. The antiair group will work on Roland air defense manual, 5-inch/54 MK42 Mount/MK68 Mod16 Naval Guns effectiveness manual, AIM-54A (Phoenix) lethality envelopes, F-18 gun sight model, print take-off assessment of Flogger B, AIM-7F model comparison, and F-14 expected hits and probability of kill envelopes. Vulnerability of the following targets will be assessed: underground facilities, M1974 SPI22mm Gun, URAL-375 truck with ammunition and POL cargoes, BTR-60pb and BRDM-II personnel carriers to fragments and armor-piercing projectiles, buried ammunition storage bunkers, communication sites, mobile electric power unit, dams, M113 Armored Personnel Carrier, and the BMD. Combined dynamic effects tests and analysis will be completed as well as tests against the hardened artillery site. The Combat Data Information Center will be supported. The Smoke Obscuration manual will be updated. The revision of the Red on Blue manual will be started.

3. (U) FY 1982 Planned Program: Revision and updating of manuals will continue. Specifically, the air-to-surface group will address target acquisition under adverse conditions, add the T-72 tank as a target in the Visual, Radar, A-10, and Helicopter manuals, reevaluate chemical effectiveness methodology, complete a revision of the Weapon Characteristic Manual, and provide Red on Blue inputs. The surface-to-surface group will compute effectiveness of the Harpoon Missile, COPPERHEAD, 76mm MK92/MK75 and MK68 Mod16; assess delivery accuracy of the Navy Guided Missile and the XM1 tank; add a ship target to the Navy pamphlets; begin work on a new indirect fire methodology; produce a small arms manual; and complete updates of the Basic Manual. The antiair group will complete pamphlets for Roland, Chaparral, and AIM-9L (Sidewinder) (helicopter-launched), calculate Phoenix lethality, add the SS-N-12 and SS-20 Soviet missiles as targets, and start investigation of focused blast effects on aircraft. Vulnerability assessments will be made on specific radars, bridge-laying tank, SA-4 missile launcher, seaport general cargo-handling facilities, hydroelectric plants, selected Blue targets, and propagation of high order explosive effects in stored ammunition. Work will continue on adding realistic battlefield elements to the effectiveness manuals. The Obscurants Effectiveness manual will be updated by adding chapters on burning vehicles, smoke pots, and gun flash/smoke. The revised Red on Blue manual will be published and updates to it will begin.

4. (U) FY 1983 Planned Program: Project D620 will continue to conduct munitions effectiveness analyses to assist all Services in developmental and program decisions.

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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

5. (U) Program to Completion: This is a continuing program.
6. (U) Major Milestones: Not Applicable
7. (U) Resources (\$ in thousands):

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	4670	5588	6572	7570	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4670	6001	6685	Not Shown	Continuing	Not Applicable

FY 1981 decrease reflects the application of general Congressional reductions.

FY 1982 indicates a slight decrease due to realignment of the program to reflect internal funding policies.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.58.06.A

DOD Mission Area: #451 - Major Ranges and Test Facilities

Title: DOD High Energy Laser Systems Test Facility (HELSTF)

Budget Activity: #6 - Defensewide Mission Support

A. (U) RESOURCES (\$ in thousands):

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	7877*	14650	42137	26901	Continuing	Not Applicable
DE97	High Energy Laser Systems Test Facility	7877*	14650	42137	26901	Continuing	Not Applicable

*FY 1980 funds were provided in P.E. 6.58.04, DE 93, White Sands Missile Range.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Defense modernization program calls for the development, testing and fielding of many new weapon systems. The objective of this program element is to establish and operate a High Energy Laser Systems Test Facility (HELSTF) capable of supporting Army, Navy, and Air Force programs. Specific emphasis is being placed on the effort in order to obtain the capability to support the Navy's SEA LITE program in FY84. This facility, when completed, will support High Energy Laser (HEL) testing to include: technology testing, subsystem and component verification, integrated system verification, system lethality testing, full-scale weapon system verification and evaluation, and operational system development and support. Another objective of this program is to preclude proliferation of HEL testing facilities to meet individual program test and evaluation requirements. This program provides for acquisition, installation, and checkout of instrumentation and facility support equipment and recurring operating costs for conducting tests not specifically identifiable with a particular laser system or project. This includes the improvement and modernization of HEL common use instrumentation to assure the test capabilities are commensurate with the state-of-the-art system to be tested.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: An intensive planning and test facility development effort will continue in FY 1982. Support of Army, Navy, and Air Force programs will continue at White Sands Missile Range (WSMR) and at contractor facilities. Beginning in the second quarter, High Energy Laser Systems Test Facility (HELSTF) and Navy SEA LITE equipment will be moved from contractor facilities for installation at the test facility. Construction of the facilities will continue throughout FY 1982 and design of the Phase II facility to house the Air Force Mid Range Advanced Technology (MRAT) beam control and pointer/tracker systems will be completed. Two major acquisitions are planned for FY 1982. The Fluid

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Program Element: # 6.58.06.A
DOD Mission Area: #451 - Major Ranges and
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Title: DOD High Energy Laser Systems Test Facility (HELSTF)
Budget Activity: #6 - Defensewide Mission Support

Supply System (FSS) provides for storage, conditioning, transfer, control, and safety functions of providing reactants, pressurants, and diluents (cryogenic liquids and high-pressure gases) to laser devices under test at the HELSTF. The Multipurpose Chemical Laser (MPCL) is a modest power deuterium fluoride (DF) or hydrogen fluoride (HF) laser device which will be used as a general-purpose laser device for damage and vulnerability testing, checking out and evaluating performance of optical components and instrumentation, conducting other system and subsystem test and evaluation where risk and operating costs can be significantly reduced by using a medium-power rather than a high-power laser device.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands) This is the initial submission for Project Element 6.58.06.A. HELSTF activity was previously funded in Program Element 6.58.04.A, US Army Materiel Development and Readiness Command (DARCOM) Ranges/Test Facilities Under Project DE93, White Sands Missile Range.

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	7877	14650	42137	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	Not Shown	Not Shown	Not Shown	Continuing	Not Applicable

The funding level increase in FY 1982 will provide \$17,000 thousand for the installation of a fluid supply system. This is a one-time purchase.

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Program Element: # 6.58.06.A
 DOD Mission Area: 451 - Major Ranges and
Test Facilities

Title: DOD High Energy Laser Systems Test Facility (HELSTF)
 Budget Activity: 16 - Defensewide Mission Support

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

	<u>FY 1980</u> <u>Actual</u>	<u>FY 1981</u> <u>Estimate</u>	<u>FY 1982</u> <u>Estimate</u>	<u>FY 1983</u> <u>Estimate</u>	<u>Total</u> <u>Additional</u> <u>to Completion</u>	<u>Estimated</u> <u>Estimated</u>
Military Construction, Defense Funds (current requirements)	32249*	3000	2000	15410	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	Not Shown	Not Shown	Not Shown	Not Shown	Continuing	Not Applicable

*FY 1980 and prior.

FY 1980 and prior funds were not obligated because funds for the High Energy Laser Systems Test Facility (HELSTF) construction program exceeded the appropriated amount. After downscoping, the construction program was readvertised in November 1980. The bids received in December 1980 were satisfactory. A contract will be awarded as soon as the approval from Congress, required by the FY 1981 Appropriations Bill, is received. The FY 1983 requirement is for additional facilities at the HELSTF to support the Air Force's Mid Range Advanced Technology (MRAT) program.

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Program Element: # 6.58.06.A
DOD Mission Area: #451 - Major Ranges and
Test Facilities

Title: DOD High Energy Laser Systems Test Facility (HELSTF)
Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION:

1. (U) The High Energy Laser Systems Test Facility (HELSTF) will be a national test range for the conduct of experiments utilizing HEL systems, subsystems and equipment requiring a major ground test facility, and/or a large controlled airspace. Planning for the facility began in 1975 at the direction of the House Armed Services Committee. Funds in the amount of \$33,449 thousand were authorized and appropriated in Title IV military construction (MILCON) in FY78. In May 1979 these funds were reprogrammed to meet an urgent requirement for NATO infrastructure. Funds were reauthorized and appropriated in FY80 to include an additional \$7.3 million authorization and \$1.8 million appropriation. The FY 1980 Supplemental Appropriations Bill reduced the funding by \$3.0 million. The FY 1981 Military Construction Appropriations Bill restored \$3.0 million.

2. (U) High Energy Laser testing was planned at three locations at the White Sands Missile Range (WSMR): HELSTF, located in the south central part of WSMR at the Multifunction Array Radar (MAR) Site; at the North Oscura Peak (NOP) Site, located in the extreme north central part of WSMR; and the High Energy Laser Instrumentation Development Laboratory (HIDL) at the extreme south central part of WSMR. The North Oscura Peak Site was constructed using \$2.2M in FY76 DOD emergency military construction funds and was completed in November 1977. The site is used to engage targets from a simulated airborne platform. From October 1978 to December 1979, the Air Force conducted its High Energy Laser Radar Acquisition and Tracking System (HELTRATS) program at North Oscura Peak, a part of the Airborne Laser Laboratory (ALL) program. As originally planned, the HELSTF was to have three test cells. Test Cell #1 was for a deuterium fluoride (DF) chemical laser for the Navy's SEA LITE test program. Test Cell #2 was for a pulsed carbon dioxide laser, originally the Navy's Thumper laser, and later the Army's Air Breathing Electric Laser (ABEL). Test Cell #3 was for a mobile laser system which would be mounted on a tracked vehicle or on a tractor-trailer in a testbed configuration. A subsequent plan moved Test Cell #2 to NOP to test the pulsed carbon dioxide laser in scenarios simulating an airborne platform. Plans to test this laser at a field site have been deferred indefinitely, and therefore construction of Test Cell #2 has been canceled. Planning is now underway to provide additional facilities at the HELSTF to accommodate the Air Force's Mid-Range Applied Technology (MRAT) program.

3. (U) Construction of the HELSTF facilities at the MAR site was advertised by the Corps of Engineers in January 1980, and bids were received in March. The bids received significantly exceeded the available funds. The principal cause for the high bids was the high cost of special tankage, piping, valving, and the control system required for the universal fluid supply system for the laser in Test Cell #1. Another contributing factor was that general construction contractors may not have been familiar with exotic fluid systems and might have tended to bid this effort with a substantial risk factor.

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Title: DOD High Energy Laser Systems Test Facility (HELSTF)
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4. (U) In order to proceed to provide a facility for the conduct of the Navy's SEA LITE test program as soon as possible, the Corps of Engineers has been requested to redesign the facility, eliminating the universal fluid supply system. This system, part of the original MILCON bid package, would have provided 100 seconds of run time for the DF laser in Test Cell #1. In the redesign, a reduced capacity (15 seconds run time) fluid supply system will be provided, utilizing government-furnished tankage which could be obtained from the laser system at the contractor's facility. The possibility of obtaining components for this reduced capacity fluid supply system from other sources is under study. The reduced capacity system will be funded with RDTE funds. In the opinion of counsel, the fluid supply system is properly considered to be installed property, and should be funded with RDTE funds. The reduced scope MILCON project was advertised for bid on 3 November 1980. Bids were opened on 18 December 1980 with an award expected within 4 to 8 weeks.

G. (U) RELATED ACTIVITIES: The HELSTF when completed will have the capability to support high energy laser systems of the Army, Navy and Air Force. The Navy SEA LITE program will be the first system to be installed and tested. In support of the overall SEA LITE program, the HELSTF activity is providing support to the factory acceptance testing of the Mid Infrared Chemical Laser (MIRACL) at the TRW Capistrano Test Site (CTS). This support, with state-of-the-art, one-of-a-kind High Energy Laser (HEL) instrumentation, is possible because of prior year funding and planning for HEL common use instrumentation. When the HELSTF mission was assigned, a DOD triservice committee was established to provide guidance, avoid duplication, and oversee the development of this common use instrumentation to be used at the facility and for triservice support. This is a continuing effort and will provide a one-of-a-kind capability in HEL testing for the Department of Defense.

H. (U) WORK PERFORMED BY: The work is performed by in-house personnel (civilian) assigned to the US Army White Sands Missile Range (WSMR) and a significant contractor effort. As workload increases when the test facility becomes operational, the ratio of contractor-to-in-house effort will increase significantly. Contractors in FY 1980 included: Sperry Systems Management, Great Neck, NY; United Technologies Research Center, Hartford, CT; Science Applications Incorporated, Atlanta, GA; McDonnell Douglas Astronautics, Huntington Beach, CA; Dynallectron, Albuquerque, NM; Physical Sciences Laboratory, New Mexico University, Las Cruces, NM; and Lockheed Engineering Management, Houston, TX. Other government agencies that are involved include: US Army Corps of Engineers, Ft Worth, TX; US Army Communications Command, WSMR, NM; US Army Missile Command, Huntsville, AL; US Navy Sea Systems Command, Washington, DC; and US Air Force Weapons Laboratory, Kirtland Air Force Base, NM. Federally Controlled Research Centers at Lincoln Laboratories, Lexington, MA, and Aerospace Corporation, El Segundo, CA, also contribute substantially to the program.

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Program Element: # 6.58.06.A
DOD Mission Area: #451 - Major Ranges and
Test Facilities

Title: DOD High Energy Laser Systems Test Facility (HELSTF)
Budget Activity: #6 - Defensewide Mission Support

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: In preparation for future HEL testing activity, White Sands Missile Range (WSMR) has spent (FY77-FY80) just over \$28 million to acquire specialized instrumentation, plan new test facilities and operational support. This effort has resulted in the acquisition of a Low Power Chemical Laser, various beam diagnostic devices such as jitter sensors, IR cameras and detectors, a Power Meter Calorimeter System (PMCS) capable of measuring the output power from an HEL device, and in the assemblage of an HEL Instrumentation Development Laboratory (HIDL) which is being used to assemble and check out various instrumentation subsystems before they are installed in the HELSTF. The Navy used the HIDL facility to conduct the first in a series of tests on their Automatic Aimpoint Selection and Maintenance (AUASAM) system. During FY75-FY76 an emergency military construction program provided for the construction of an HEL test site located atop a mountain peak (North Oscura Peak). This remote site, HEL North Oscura Peak (HELNOP), supported the Air Force's High Energy Laser Radar and Acquisition Tracking System (HELRTS) for a test program of approximately 8 months. A design has been completed for expansion and upgrading the HELNOP facility to support future lethality demonstration programs. A complete design package for HELSTF was prepared and advertised. Bids have been received; however, the contract is awaiting Congressional approval.

2. (U) FY 1981 Program: Phase I construction for the HELSTF will be in progress. Additional instrumentation systems will arrive and be tested and checked at the High Energy Laser Instrumentation Development Laboratory (HIDL). Acquisition of a Multi-Purpose Chemical Laser (MPCL) for technology base support will have begun. Full support of the Navy's Automatic Aimpoint Selection and Maintenance (AUASAM) program will be provided at the HIDL with the completion and installation of the Auxiliary Beam Director (ABD).

3. (U) FY 1982 Planned Program: Construction activity at the HELSTF will be at its peak. Extensive component contractor/WSMR coordination will be taking place as equipment interfaces are defined and instrumentation installed. Final design and contract award for Phase II construction will occur, as required. The Fluid Supply System (FSS) will be assembled. Additional instrumentation systems will arrive and be checked out at the HIDL.

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Program Element: # 6.58.06.A
DOD Mission Area: #451 - Major Ranges and
Test Facilities

Title: DOD High Energy Laser Systems Test Facility (HELSTF)
Budget Activity: #6 - Defensewide Mission Support

4. (U) FY 1983 Planned Program: Phase I construction for the High Energy Laser systems Test Facility (HELSTF) will be completed. Phase II construction, if required, will be at its peak. The Fluid Supply System (FSS) will be integrated into the facility. Integration of all instrumentation systems into the HELSTF will be in progress. Delivery of the Navy's experimental Test System will occur, and the resulting integration of that system into the facility will take place. An Operation and Maintenance (O&M) contractor for the HELSTF will be brought on board and will participate in the integration process. Preparations for providing test support the following year will be in progress.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.72.A

DOD Mission Area: #471 - General Management Support

Title: Productivity Investment Funding

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion Continuing	Total Estimated Costs Not Applicable
	TOTAL FOR PROGRAM ELEMENT	0	0	3900	1500		
DE78	Productivity Investment Funding - Ranges	0	0	3900	1500	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for Army support of the Department of Defense Productivity Enhancement Investment Program, which has been established for the express purpose of improving personnel productivity through expanded capital investment in productivity-enhancing equipment.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Candidate productivity enhancement projects were evaluated based on return on investment, internal rate of return, and manpower savings. Two projects that enhance productivity of Army test ranges were selected for FY 1982 funding. These provide for the greatest benefits relative to their costs.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion Continuing	Total Estimated Cost
RDTE					
Funds (current requirements)	0	0	3900	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	0	0	0	Continuing	Not Applicable

FY 1982 is now proposed for funding based on Secretary of Defense guidance.

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Program Element: #6.58.72.A
DOD Mission Area: #471 - General Management Support

Title: Productivity Investment Funding
Budget Activity: #6 - Defensewide Mission Support

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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Program Element: #6.58.72.A

Title: Productivity Investment Funding

DOD Mission Area: #471 - General Management Support

Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Department of Defense (DOD) has established a Productivity Enhancement Investment Program for the express purpose of improving personnel productivity through expanded capital investment in productivity-enhancing equipment. This program element has been newly established to provide Army Research, Development, Test, and Evaluation (RDTE) support for this DOD program. Funds identified to projects within this program cannot be reprogrammed without OSD approval. Fiscal controls are being established to assure that projects are funded as planned. Post-investment analysis will be conducted to identify the benefits achieved, to include the impact on productivity of the organizations involved, and the disposition of manpower savings.

G. (U) RELATED ACTIVITIES: The DOD Productivity Enhancement Investment program encompasses efforts in all three Services and selected Defense agencies in the following appropriations: Military Construction, Operations and Maintenance, Procurement, and RDTE.

H. (U) WORK PERFORMED BY: This project provides for procurement of equipment by contract. Contractors have not been selected.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Productivity enhancement investment projects were not separately identified.

2. (U) FY 1981 Program: Productivity enhancement projects were not separately identified.

3. (U) FY 1982 Program: Most of the FY 1982 funding is for procurement of equipment that will establish an automated capability to perform development testing of software and interoperability of command, control, communications, and intelligence (C³I) systems at the US Army Electronics Proving Ground, Fort Huachuca, AZ. The equipment will enable the Army to perform such testing under full interacting loads in simulated battlefield environments. Remaining funds, approximately \$400 thousand, will be used to establish word processing centers at Dugway Proving Ground, UT. These centers will be capable of revising, sending, and receiving data and information between centers at Dugway and at other installations including higher headquarters. This capability will improve overall efficiency, eliminate temporary clerical spaces, and reduce the volume of administrative workload.

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Program Element: #6.58.72.A

Title: Productivity Investment Funding

DOD Mission Area: #471 - General Management Support

Budget Activity: #6 - Defensewide Mission Support

4. (U) FY 1983 Planned Program: Complete procurement of equipment that will establish an automated capability to test software and interoperability of C I systems. Funding has not been provided for other potential FY83 productivity enhancement projects until analyses of benefits versus costs are completed and then weighed within the overall DOD Productivity Enhancement Investment program.

5. (U) Program to Completion: Funding for the outyears is contingent upon success of the FY 1982 program and upon the relative merits of potential projects.

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.90.4

DOD Mission Area: #471 - General Management Support

Title: Audiovisual Support for Research and Development Program

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1981 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	2318	2350	Continuing	Not Applicable
MM89	Audio-Visual Support	0	0	2318	2350	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This continuing program will provide resources for management and operation of audiovisual activities at RDTE-operated installations/commands.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Resource requirements for this program are requested for audiovisual services or production, duplication, or distribution of audiovisual products in support of RDTE activities at RDTE-operated installations/commands. Includes salaries and operating expenses. Through FY 1981, audiovisual activities and functions in support of Army RDTE were not reported separately but as part of the total cost for each project.

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands) Not Applicable. This is a first submission.

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

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Program Element: #6.58.90.A
DOD Mission Area: #471 - General Management Support

Title: Audiovisual Support for Research and Development Program
Budget Activity: #6 - Defensewide Mission Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Resource requirements for this program element have been programmed in accordance with OSD Program Change Decision X-9-012 dated 30 October 1979 to satisfy congressional interest in identifying audiovisual resources. Funding provides audiovisual services in support of RDTE activities at RDTE-operated installations/commands. Includes in-house and contract operation pertaining to still and motion picture photography, television, audiovisual production and documentation, audio recording, replication and distribution (library) activities, graphic arts, presentation systems, and the fabrication, storage, and loan of audiovisual products, equipment, displays, aids, and devices. Includes civilian personnel hire, temporary duty travel, contracted services and procurement of supplies, materials, and equipment.

G. (U) RELATED ACTIVITIES: None.

H. (U) WORK PERFORMED BY: Subordinate RDTE commands of the US Army Materiel Development and Readiness Command.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Not applicable; Army RDTE audiovisual support previously reported as part of total cost for each RDTE project.

2. (U) FY 1981 Program: Not Applicable.

3. (U) FY 1982 Planned Program: Continued provision of audiovisual products and services in support of Army RDTE activities, programs, and projects at RDTE-operated installations/commands.

4. (U) FY 1983 Planned Program: Continue audiovisual support.

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

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FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.58.98.A

DOD Mission Area: #471 - General Management Support

Title: Army Management Headquarters Activities

Budget Activity: #6 - Defensewide Mission Support

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	26901	30642	39896	41807	Continuing	Not Applicable
HH02	Army Management Headquarters Activities (AMHA)	26901	30642	39896	41807	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element was established at the direction of the Office, Secretary of Defense, for the purpose of uniformity in programing, reporting, and justifying Management Headquarters Activities. This program provides the funding for those elements of the US Army Corps of Engineers headquarters, the US Army Materiel Development and Readiness Command headquarters, and six subordinate R&D command headquarters that (1) develop policy and guidance; (2) perform long-range planning, programing, and budgeting; (3) provide the management and distribution of resources; and (4) conduct program performance review and evaluation for the Army Research, Development, Test and Evaluation, Army appropriation. The requested resources for this program element will provide salaries and related personnel benefits for authorized civilian personnel and the necessary administrative support (temporary duty travel, operating supplies and equipment).

C. (U) BASIS FOR FY 1982 RDTE REQUEST: The program request is based upon the authorized military and civilian staffing which is necessary to perform those management functions essential to maintaining an efficient, effective, and viable Research, Development, Test and Evaluation program for the US Army. The personnel performing these functions are located at Headquarters, US Army Corps of Engineers, US Army Materiel Development and Readiness Command, and six subordinate R&D commands. This program element is frequently referred to as a "people" element since approximately 85 percent of the total resources is used for payment of civilian salaries and related benefits. The balance of the program is for necessary administrative support, mission travel, operating supplies and equipment. Since the program element is people intensive, fluctuations continue in the resources required due to realignment of functions based upon the identification of additional management headquarters functions.

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Program Element: #6.58.98.A

DDO Mission Area: #671 - General Management Support

Title: Army Management Headquarters Activities

Budget Activity: #6 - Defenseable Mission Support

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	26901	30642	39896	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	24436	35717	33771	Continuing	Not Applicable

Actual establishment of the Army Management Headquarters Activities 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. This program element is people intensive, and below threshold reprogramming occurs annually. Budget guidance issued by Office, Secretary of Defense, prohibits inclusion in the basic budget any provision for anticipated pay raises. The additional funds required to support civilian pay raises are addressed in supplements to the budget. The RDTE,A civilian pay raise requirements submitted for inclusion in the Department of Defense supplemental have repeatedly been denied by OSD/OMB. For this program element, which includes only pay of civilian personnel and associated support costs, the pay raises cannot be absorbed. Alternatives are to reduce the on-board civilian personnel, or to finance the pay raise costs by performing below threshold reprogramming. Any reduction in this program element, whether it be an unspecified Congressional reduction or a denial for a supplemental request, leaves the same alternatives--reduce people or reprogram funds from R&D mission projects. In FY 1980, funds were reprogrammed into this program element to provide for pay of on-board personnel due to insufficient funds. The current requirements shown for FY 1981 reflect an unspecified Congressional reduction of \$6.0 million, and the transfer of the US Army Corps of Engineers R&D Headquarters function from program element 6.58.01.A to this element. Because of the unspecified Congressional reduction, below threshold reprogramming will be necessary in FY 1981 to pay on-board civilian personnel, and as an alternative to implementing a reduction in staffing, charge certain costs to mission projects. The funding request for FY 1982 will provide for the pay and support of authorized personnel, as currently identified. (The request does not provide for any FY 1982 pay raise which may be prescribed). Efforts are ongoing to correctly identify functions which are Army Management Headquarters Activities and to properly align the funds to support these functions. Of the requested increase in FY 1982, \$1.4 million is a result of this effort. The affected commands are US Army Corps of Engineers, \$700 thousand; Headquarters, US Army Materiel Development and Readiness Command, 400 thousand; Tank-Automotive Research and Development Command, \$1.8 million; Armament Research and Development Command, \$2.0 million; Communications Research and Development Command, \$300 thousand; Electronics Research and

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Program Element: #6.58.98.A

Title: Army Management Headquarters Activities

DOD Mission Area: #471 - General Management Support

Budget Activity: 16 - Defensewide Mission Support

Development Command, \$400 thousand; and the Army Missile Command (-2.2 million). Not only the functions, but also the associated dollar resources have been transferred from various program elements within the Army RDT&E appropriation. The balance of the requested increase, \$2.7 million, is to provide for the October 1980 civilian pay raise (\$2.0 million), military per diem increase (\$100 thousand), and inflation for nonpersonnel costs (\$600 thousand).

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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Program Element: #6.58.98.A

DOD Mission Area: #471 - General Management Support

Title: Army Management Headquarters Activities

Budget Activity: #6 - Defensewide Mission Support

F. (U) **DETAILED BACKGROUND AND DESCRIPTION:** This program element was established in accordance with Department of Defense (DOD) Directive 5199.73, Department of Defense Management Headquarters, dated 11 April 1975. This DOD Directive contained instructions to update the DOD system for identification and management of the number and size of DOD Management Headquarters Activities, and identified the type of functions to be included. As a result of an Army Materiel Acquisition Review Committee recommendation, the Army's major development agency, the US Army Materiel Development and Readiness Command, realigned its subordinate headquarters into separate R&D and Readiness Commands. This combination of changes resulted in a shift of Army resources between appropriations as well as between program elements within the Research, Development, Test and Evaluation, Army appropriation. FY 1979 was the first full year of operation under this program element.

G. (U) **RELATED ACTIVITIES:** Management headquarters activities perform policy and guidance development; long-range planning, programing, and budgeting; management and distribution of resources; and program performance review and evaluation. These activities support Research and Development effort conducted at RDTE laboratories, test facilities, and activities.

H. (U) **WORK PERFORMED BY:** US Army Materiel Development Readiness Command, Alexandria, Virginia, six subordinate R&D commands, and the US Army Corps of Engineer Headquarters.

I. (U) **PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:**

1. (U) **FY 1980 and Prior Accomplishments:** This program was established in FY 1979 to provide 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. FY 1980 resources provided for the continuation of these functions. However, the funding level was insufficient to support on-board personnel, and below threshold reprogramming was accomplished to preclude a reduction in personnel.

2. (U) **FY 1981 Program:** The FY 1981 approved resources are inadequate to continue full support of the Army Management Headquarters Activities. The FY 1981 request was reduced \$6.1 million by an unspecified Congressional reduction, and civilian pay raise funds requested in the FY 81 supplemental request have been denied. Since this program element provides only for pay of civilian personnel and associated support costs, any reduction results in (1) reprogramming action to meet payroll costs, (2) a reduction in the work force, or (3) charging administrative costs to mission projects. The magnitude of the FY 1981 unspecified Congressional reduction could result in each of the three alternatives occurring during the execution of the FY 1981 program.

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Program Element: #5.58.98.A
DOD Mission Area: #471 - General Management Support

Title: Army Management Headquarters Activities
Budget Activity: #6 - Defensewide Mission Support

3. (U) FY 1982 Planned Program: Provides only essential resources for full support of authorized civilians, as currently identified, for operation of the R&D command headquarters, as indicated below. Programming includes civilian salaries and related administrative support (personnel benefits, travel, operating supplies and equipment). The variance between FY 1981 and FY 1982 request is directly attributable to an unspecified Congressional reduction to the FY 1981 request. It will be necessary, during the execution of the FY 1981 program, to perform below threshold reprogramming to sustain operations of the R&D Army Management Headquarters Activities. Additional variances are the result of the Army's continuing effort to properly align the functions and funding of these activities.

	<u>FY 1980</u>	<u>FY 1981</u>	<u>FY 1982</u>	<u>FY 1983</u>	<u>Additional to Completion</u>	<u>Total Estimated Cost</u>
Corps of Engineers HQ	469	642	708	709	Continuing	Not Applicable
Academy Research & Development (R&D) Command	5365	5466	8470	8823	Continuing	Not Applicable
Aviation R&D Command	1580	2169	2985	3044	Continuing	Not Applicable
Communications R&D Command	3485	3763	5116	5209	Continuing	Not Applicable
Electronics R&D Command	4585	3821	5224	5307	Continuing	Not Applicable
Missile R&D Command	4750	4453	3884	3970	Continuing	Not Applicable
Tank Automotive R&D Command	2280	5756	7833	8071	Continuing	Not Applicable
DARCOM Headquarters	4387	5272	5696	6674	Continuing	Not Applicable
TOTAL	26901	30642	39896	41337		

4. (U) FY 1983 Planned Program: Continue support of RDTE activities listed above.

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

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