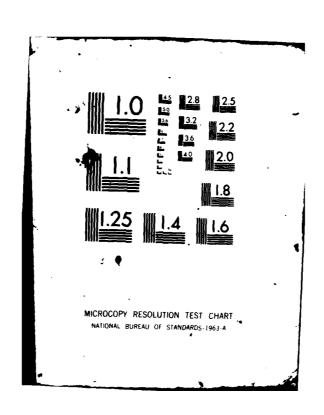
DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/G 5/1 DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT TEST & EVALUA--ETC(U) FEB 62 AD-A114 688 UNCLASSIFIED DA-PAM-5-6-1-VOL-2 NL # 51.4586



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VOLUME II

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Descriptive Summaries Of The





RESEARCH DEVELOPMENT TEST & EVALUATION Army Appropriation FY 1983 (U)

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

82 0 0 091

VOLUME II

DESCRIPTIVE SUMMARIES FOR PROGRAM ELEMENTS

OF THE

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY PROGRAM

FY 1983 (U)

FEBRUARY 1982

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

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FORWARD

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 1983 budget hearings. This information supplements the testimony given by US Army witnesses.

In recent years the Army RDTE program has concentrated on the development of a new generation of major weapons systems across the entire spectrum of Army mission areas. Most of these systems are now completing development and will be transitioning to procurement in the next few years. In FY 1983 and beyond, increased emphasis will be placed on the technology base in areas such as advanced surveillance and target acquisition; improved command, control, communications, and intelligence; self-contained munitions; biotechnology; and the soldier-machine interface. New technology which is advancing from exploratory development to advanced development in areas such as laser weapons systems and lightweight air defense and armor/antiarmor systems will be demonstrated. Efforts will be accelerated in research for microelectronics, millimeter wave technology, fire control, and development of medical, chemical, and life support material for use in chemical/biological defense. Product improvement programs on fielded systems such as the Cobra helicopter's engine, MI Abrams Tank, and Bradley Fighting Vehicle System will be aggressively pursued in the future. The development of the Ballistic Missile Defense System will have high priority in this program to support the President's strong commitment to developing a viable ballistic missile defense. The Congressional Descriptive Summaries address these and other thrusts in detail.

These volumes contain a descriptive summary for each program element to be financed during FY 1983. Descriptive Summaries for projects within the program elements to be financed during FY 1983 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 1983. 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.

A direct comparison of FY 1981, FY 1982, and FY 1983 data in the Program Element Listing shown in the Program Element Listing dated March 1981 will reveal differences. Major procedural causes for different are attributable to the following factors:

- a. Restructuring of the FY 1983 program to provide greater visibility for certain efforts and co improve the effective management of the RDTE program.
 - b. Restructuring of the FY 1981 and FY 1982 programs for comparability to the FY 1983 program structure.

Procurement data are shown where applicable for items in engineering or operational development. Military construction data are also provided where applicable. Classified information is identified by the use of brackets [].

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PY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 1.28.14.A

DOD Mission Area: #331 - Strategic Command and Control

Title: Special Program

Budget Activity: 13 - Strategic Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estinate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
D333	TOTAL FOR PROGRAM ELEMENT SPECIAL PROGRAM	-	~		-		7.
		_					_

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Program content is TOP SECRET Limited Distribution, Special Access Required--precluding further description in this summary. Access to information in this program is controlled by the Director, Joint Program Office, Office of the Secretary of Defense.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Continue RDTE effort.
- D. COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

•	FY 1981	FY	1982	FY	1983		itional Completion	Est	otal Imated Cost
RDTE							-		٠,
Funds (current requirements) Funds (as shown in FY 1982	•		-	-	-	•	-	÷	-
submission)	Not Shown								

Details on funding increases are available upon request in accordance with paragraph B above.

Program Element: # 1.28.14.A

DOD Mission Area: #331 - Strategic Command and Control

Title: Special Program

Budget Activity: 13 - Strategic Programs

OTHER APPROPRIATION FUNDS: (\$ in thousands) Other Procurement, Army

	FY 1981 Actual		1982 imate		1983 imate		1984 imate		ditional Completion	Est	Total timated Cost
Funds (current requirement) Procurement OPA 2			~	-	_	-	_	-	-	-	~
Funds (as shown in FY 1982	-	~	-	-				-	_	-	
submission)	Not Appli	cable									

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Program Element: # 1.28.14.A

DOD Mission Area: #331 - Strategic Command and Control

Budget Activity: #3 - Strategic Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Details on the funds are available upon request in accordance with paragraph B above.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 1.28.17.A DOD Mission Area:

1331 - Strategic Command

Title: Mobile Command Centers
Budget Activity: #3 - Strategic Programs

and Control

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
D373	TOTAL FOR PROGRAM ELEMENT Mobile Command Center	0 0	0 0	4961 4961	49249 49249	9801 9801	64011 64011
	(MCC)						

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: A Mobile Command Center (MCC) system is being developed to provide a near-term survivable and endurant National Military Command System (NMCS) Command Center structure capable of worldwide nuclear forces execution/termination conventional forces direction/reconstitution and interface with the civil government in support of the National Command Authority (NCA) during and after a nuclear attack on the United States.
- C. (U) BASIS FOR FY 1963 RDTE REQUEST: Army participation in the MCC is initiated. Engineering development will begin with the transfer of design specifications of the prototype MCC previously developed by the Defense Communications Agency. Efforts will be the foundation to incorporate design improvements into the anticipated configuration of these mobile centers.

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Program Element: # 1.28.17.4

DOD Mission Area: #331 - Strategic Command and Control

Title: Mobile Command Centers
Budger Activity: #3 - Strategic Programs

Milestone Dates
Shown in FY 1982 Submission
Not Applicable Current Milestone Dates Major Milestones
Army Management Initiated Defense Communications Agency Prototype Testing Complete 1**QFY**84 2QFY85 ED Complete 4QFY85 Initial Operational Capability

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ 1n thousands)

(U) COMPARISON WITH PT 1302 A				Additional	Estimated
	FY 1981	FY 1982	FY 1983	To Completion	Cost
RDTE	0	0	4961	59050	64011
Funds (current requirements) Funds (as shown in FY 1982 submission)	N/A	n/a	N/A	n/A	N/A

Requirements initiated in FY 1983 submission.

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Program Element: # 1.28.17.A

DOD Mission Area: #331 - Strategic Command and Control

Title: Mobile Command Centers
Budget Activity: #3 - Strategic Programs

Total

E. (U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Estimated Cost
Procurement (0	0	O	0	844700	844700
Funds (Current requirements) Funds (as shown in FY 1982 submission)	N/A	N/A	N/A	N/A	N/A	N/A

Requirement initiated in FY 1983 submission.

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Program Element: # 1.28.17.A

DOD Mission Area: #331 - Strategic Command and Control

Title: Mobile Command Centers
Budget Activity: #3 - Strategic Programs

F. (U) DETAILED BACKCROUND AND DESCRIPTION: There is a need to develop a survivable Mobile Command Center (MCC) with the capability to provide in the near term an endurant and survivable National Military Command System Command Center structure. The systems will be capable of world wide nuclear forces execution/termination conventional force direction/reconstruction and interface with the civil government. These centers must be able to survive a general nuclear war by means other than hardening. It must also perform at least the minimum essential national command post tasks throughout a prolonged general war when no other currently existing national command center is available or capable of performing the required tasks.

- G. (U) RELATED ACTIVITIES: The Worldwide Military Command Control System (WWMCCS) System Engineer (WSE) Defense Communications Agenc (DCA) has undertaken an experimental program to determine if a system of proliferated mobile vehicles a provide a survivable and enduring command, control, and communications capability for the National Military Command ovstem.
- H. (U) WORK PERFORMED BY: TRW Corporation, Fairfax, VA, IBM Corporation, Rosslyn, VA. These contractual efforts have been under the review of Defense Communications Agency (DCA).
- 1. (U) PROCRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 1981 and Prior Accomplishments: Not Applicable
 - 2. (U) FY 1982 Program: Not Applicable
- 3. (U) FY 1983 Planned Program: The Army participation in the Mobile Command Center (MCC) program begins this year. All necessary developmental work will be performed, and the proposed system will be ready for full-scale development. The Army will participate in the testing of the prototype MCC with DCA. Engineering development will begin with the transfer of design data from DC. to the Army. These data will be expanded into requirement and specifications necessary to release contracts for Engineeri g Development Models (EDM). These EDM models will incorporate the addition and deletions resulting from the design, assembly, and testing of the Advanced Development Models (ADM), associated studies, and operational needs.
- 4. (U) if 1984 Planned Program: Program will consist of design, fabrication, assembly and test of the EDM model. Documentation for the Test Program will be prepared and conducted.

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Program Element: # 1.28.17.A

DOD Mission Area: #331 - Strategic Command and Control

Title: Mobile Command Centers
Budget Activity: #3 - Strategic Programs

5. (U) Program to Completion: EDM model test evaluation will be performed in FY 1985. Concurrent with this evaluation the Documentation for Operational Systems Development will be prepared. Initial Operational Capability is scheduled for FY 1985. Contract award anticipated for occupational concepts.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 1.28.21.A

DOD Mission Area: #331 - Strategic Command and Control

Title: CLASSIFIED PROGRAM

Budget Activity: #3 - Strategic Programs

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

Project Number	<u>Title</u>	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	0	0		0	CLASSIFIED	CLASSIFIED CLASSIFIED
D338	CLASSIFIED PROGRAM	0	0		0	CLASSIFIED	CLASSIFIED

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Program content is SECRET/No Foreign Dissemination, precluding is ther description in this summary. Classification authority and access are controlled by the Deputy Chief of Staff for Research, Development, and Acquisition, Department of the Army.

C. (U) BASIS FOR FY 1983 RDTE REQUEST: RDTE effort.

Program Element: 1.28.21.A

DOD Mission Area: #331 - Strategic Command and Control

Title: CLASSIFIED PROGRAM

Budget Activity: #3 - Strategic Programs

D. COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	0	0		CLASSIFIED	CLASSIFIED
Funds (ss shown in FY 1982 submission)		Not Shown			Not Shown

E. (U) OTHER APPROPRIATION FUNDS: None

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Program Element: 1.28.21.A

DOD Mission Ares: #331 - Strategic Command and Control

Title: CLASSIFIED PROGRAM
Budget Activity: 13 - Strategic Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: See paragraph B above.
- G. (U) RELATED ACTIVITIES: See paragraph B above.
- H. (U) WORK PERFORMED BY: Both in-house and under contracts.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: Details may be provided upon request.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.04.A

DOD Mission Area: #121 - Ballistic Missile Defense

Title: Ballistic Missile Defense Advanced Technology Program
Budget Activity: 13 - Strategic Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 123222	FY 1982 Estimate 126494	FY 1983 Estimate 143243	FY 1984 Estimate 151464	Additional To Completion Continuing	Total Estimated Costs N/A
D215	BMD Advanced Technology	123222	126494	143243	151464	Continuing	N/A

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Ballistic Missile Defense (BMD) Advanced Technology Program is a broadly based research and development effort designed to exploit new and emerging technologies—seeking improved cost-effective methods to perform BMD. The US is faced with a growing Soviet ballistic missile threat and must continue to advance and develop the technologies required to provide options to counter this threat. The program is essential to assure that persistent Soviet BMD efforts do not further erode the level of national BMD capability that the US has maintained since the 1972 ABM Treaty was entered into force.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: The BMD Advanced Technology Program will continue to maintain the pace of BMD advanced development, aggressively searching for and exploiting innovative concepts and guarding against technological surprise. The FY83 program objectives are to develop the technology for excatmospheric BMD options, to provide selected technology for endoatmospheric BMD, to assist in improving strategic offense force survivability and formulating foreign threat assessment, and to maintain a strong BMD technology base activity to develop new 105 capability. Emphasis will be placed on demonstrating excatmospheric defense capabilities, resolving critical issues in terminal nonnuclear kill technology, and continuing advanced technology efforts on radar technology, sensor technology, unique discrimination techniques, advanced data processing techniques, advanced interceptor missiles, and advanced BMD construct analysis.

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Program Element: #6.33.04.A

DOD Mission Area: #121 - Ballistic Missile Defense

Title: Ballistic Missile Defense Advanced Technology Program
Budget Activity: #3 - Strategic Programs

Major Milestones

Current Milestone Dates Milestone Dates
Shown in FY 1982 Submission

Designating Optical Tracker Flight 6 Millimeter Wave Instrumentation

4th Quarter FY 1983

None Shown None Shown

Radar FOC

4th Quarter FY 1983

Forward Acquisition System Subsystem

2nd Quarter FY 1983

None Shown

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	PY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cont
RDTE Funds (current requirements) Funds (as shown in FY 1982 submission)	123222	126494	143243	Continuing	N/A
	123222	126883	146623	Continuing	N/A

The decrease in FY82 and FY83 reflects the application of revised inflation indices.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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Program Element: #6.33.04.A
DOD Mission Area: #121 - Ballistic Missile Defense

Title: Ballistic Missile Defense Advanced Technology Program

Budget Activity: 13 - Strategic Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The major objectives of the BMD Advanced Technology Program are to maintain US leadership in BMD technology, prevent technological surprise, support strategic offensive deterrent forces, and support intelligence assessments. The BMD Advanced Technology Program has, in recent years, placed increasing emphasis upon exoatmospheric intercept technologies and upon the technological upgrades of state-of-the-art terminal defense systems, to include nonnuclear kill interceptors and distributed defense components. Major technology accomplishments have included significant advances in the fields of BMD sensors, discrimination techniques, data processing hardware and software for BMD applications, and advanced endoatmospheric and exoatmospheric interceptors. Long wave infrared (LWIR) optical sensor technology has been developed allowing long-range target acquisition, discrimination, and tracking from missile-borne sensors. Nonnuclear homing and kill vehicle technology has been developed and ground tested. Solid state radar techniques have been developed which allow for smaller and less expensive radars for terminal defense. Considerable progress has been achieved in directed energy weapon phenomenology. High-energy kill mechanisms have been successfully demonstrated using simulated ICBM components. The program will continue to address key issues and expand BMD capabilities in the exoatmospheric defense, pressing toward demonstrations of exoatmospheric systems and exploitation of potential space-based defense concepts. Terminal defense technology advancement will pursue optical airborne adjuncts, nonnuclear kill constructs, and development of low-cost, rapidly manufacturable, rapidly deployable interceptors to achieve nonnuclear defense of point targets.
- G. (U) <u>RELATED ACTIVITIES</u>: The BND Advanced Technology Program is fully coordinated with related programs being sponsored by other Army, other DOD, and other Government agencies. Included are the Army Materials and Mechanics Research Center (PE 6.11.02.A), Air Force Intelligence Gathering (PE 3.10.15.F), Air Force Deep Space Satellite Surveillance (PE 6.34.28.F), Air Force Advanced Strategic Missile Systems program (PE 6.33.11.F), and Defense Advance Research Projects Agency (PE 6.27.07.E; PE 6.11.01.E; PE 6.23.01.E). Every effort is made to prevent duplication of effort through automated literature searches, coordination meetings, memorandums of agreement, etc.
- H. (U) WORK PERFORMED BY: The five major contractors are: Massachusetts Institute of Technology, Lincoln Laboratory, Lexington, MA; The Boeing Company, Seattle, WA; McDonnell Douglas Corporation, Huntington Beach, CA; Hughes Aircraft Company, Fullerton, CA; and Honeywell, Inc., Clearwater, FL. There will be approximately 100 additional contractors and other Government agencies for an additional value of \$83 million. The developing organization responsible for the Program is the Ballistic Missile Defense Advanced Technology Center, Nuntsville, AL.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: Major technology accomplishments have included the development of small netted radars, improved interceptor missiles, new discrimination techniques, and the adaptation of large, high-powered

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Program Element: #6.33.04.A

DOD Mission Area: #121 - Ballistic Missile Defense

Title: Ballistic Missile Defense Advanced Technology Program
Budget Activity: #3 - Strategic Programs

commercial data processors for BMD use. A modular missile-borne computer was designed that is capable of performing a multiplicity of data processing functions on board the interceptor missile. The Designated Optical Tracker (DOT) flight test program was initiated to verify LWIR sensor performance in a realistic BMD environment; four successful flight tests have been conducted. A technology base development was initiated to provide the potential for using nonnuclear kill devices in endoatmospheric defense systems. Sled tests related to the development of fuze and warhead subsystems for the endoatmospheric nonnuclear kill program have been initiated. High-technology engagement constructs for the exoatmospheric regime were synthesized based upon flight-tested optical sensors, direct impact kill guidance and control technology, and miniaturized data processing technology. The design of subsystem has been initiated. The Forward Acquisition System (FAS) integrated ground test program was initiated to resolve technological issues associated with early warning and attack assessment for BMD systems. Hardware procurements for the FAS integrated ground tests have been initiated. Requirements definition techniques for a distributed data processing system design for BMD have been developed. The development of an advanced distributed data processing testbed has been initiated. A program was initiated to define dynamically reconfigurable computer architecture. The installation for the COBRA JUDY shipborne data collection radar was completed. The Optical Aircraft Measurement Program has been initiated. The assessment of directed energy weapon technology for BMD applications was initiated, and utility analyses of space-based lasers in a BMD role have been conducted in support of the DOD space-based laser studies.

2. FY 1982-FY 1984 Planned Program: The BMD Advanced Technology efforts will include research and hardware purchases in the areas of advanced sensors, unique discrimination techniques, advanced data processing networks and software, advanced endostmospheric and exoatmospheric interceptors, and BMD construct analyses. The radar technology will include Full Operational Capability of a Millimeter Wave Instrumentation Radar at the Kwajalein Missile Range. The Optics Program will provide for the testing of a thousand-element, hardened optical array; development of a laser vulnerability prediction model; and three Designating Optical Tracker (DOT) flights. The Discrimination Technology Program will include Initial Operation of the COBRA JUDY shipborne data-gathering radar, procurement of aircraft and continued design and fabrication of the sensor for the Optical Aircraft Measurements Program (OAMP), and continued

Data processing technology will include demonstration of a dynamically reconfigurable architecture, demonstration of a residue processor prototype, and demonstration of realtime processor and memory allocation under decentralized control. The Interceptor Technology Program will complete the design review for test hardware for an improved direct impact kill vehicle prototype, initiate fabrication of millimeter wave fuze components, and complete proof-of-principle tests for an advanced programable autopilot. Analytical simulations, procurement, and pretesting of components for the Forward Acquisition System integrated ground test program will continue. Technology assessment and integration programs will be continued.

Program Element: #6.33.04.A

DOD Mission Area: #121 - Ballistic Missile Defense

Title: Ballistic Missile Defense Advanced Technology Program
Budget Activity: #3 - Strategic Programs

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

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.08.A Title: Ballistic Missile Defense Systems Technology Program

DOD Mission Area: #121 - Ballistic Missile Defense Budget Activity: #3 - Strategic Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 143410	FY 1982 Estimate 335615	FY 1983 Estimate 727311	FY 1984 Estimate 659465	Additional To Completion Continuing	Total Estimated Costs Not Applicable	
	BMD Systems Technology Program	143410	335615	727311	659465	Continuing	Not Applicable	

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Ballistic Missile Defense (BMD) program is the nation's only program devoted to developing an active defense against attack by intercontinental ballistic missiles (ICBM's). It is through the Systems Technology Program (STP) that the BMD program provides the capability to develop and deploy strategic defensive systems in a responsive timeframe. The STP integrates advances in technology into BMD system concepts and then validates the key issues through simulations and laboratory and field tests. The program is essential to assure the timely availability of BMD options to counter the growing Soviet ballistic missile threat to the US.
- C. BASIS FOR FY 1983 RDTE REQUEST: The BMD Systems Technology Program will continue the definition, development, and validation of BMD system concepts which can cost-effectively counter the growing Soviet ballistic missile threat. System concepts to be emphasized in the FY 1983 program include the Low Altitude Defense (LoAD) system, exoatmospheric defense, and layered defense. Primary emphasis will be on the LoAD system with accelerated development continuing in order to support the option for a 1984 LoAD deployment decision to defend silo-based ICBM's. Resolution of key system and technology issues associated with ex-atmospheric defense and layered defense will continue, with an objective to provide outyear options for a development decision. The Homing Overlay Experiment (HOE) will be completed in FY 1983, with the execution of the last two of four planned flight tests. Effort will continue on the definition and refinement of BMD systems for the 1990's with emphasis on the development of system characteristics for ICBM defense and high-value target defense.

Program Element: #6.33.08.A

rogram Element: #6.33.08.A Title: <u>Ballistic Missile Defense</u> Budget Activity: #3 - Strategic Programs

Milestone Dates Current Shown in FY 1982 Submission Major Milestones Milestone Dates

1st Homing Overlay Experiment

Completion of Low Altitude Defense (LoAD) Prototype **Demonstration**

NA

LoAD System Design Review

September 1982

Completion of LoAD System

Validation

NA

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	143410	335615	727311	Cont inuing	Not Applicable
Funds (as shown in FY 1982 submission)	181038	301685	263143	Continuing	Not Applicable

The program reflects a \$37.628 million decrease in FY 1981 based on reduction of \$39 million from funding guidance for LoAD enhancement and inflation increase totaling \$1.372 million. The program reflects \$33.930 million increase in FY 1982 based on a \$52 million request for LoAD acceleration. FY 1983 program reflects a \$467.567 million increase for LoAD acceleration to insure the availability of a rapidly deployable BMD system that will support the option for a deployment in 1984.

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

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rogram Element: #6.33.08.A Title: Ballistic Missile Defense Systems Technology Program

DOD Mission Area: #121 - Ballistic Missile Defense Budget Activity: #3 - Strategic Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The principal objective of the BMD Systems Technology Program (STP) is to retain a posture from which cost-effective and state-of-the-art BMD systems can be rapidly developed and deployed. This objective is achieved by formulating evolutionary BMD system concepts which are based on both proven capability and new technology, and by validating these system concepts through high-fidelity simulations and laboratory and field tests. In recent years, the STP has greatly extended BMD systems capability across the board, to include resolution of major critical issues associated with terminal defense systems, initiation of field tests to resolve key technology issues associated with exoatmospheric defense, validation of advanced technology in a systems context, and the definition of innovative BMD system concepts. A major accomplishment has been the definition of the LoAD system and the formulation of a program to accomplish its technical validation. Under the Administration's strategic forces modernization plan, LoAD is being pursued as an option to provide long-term survivability of the US land-based ICBM forces, and the LoAD development program is being accelerated to support the option for a deployment decision in 1984. Systems engineering, detailed design, and component development and testing will continue on the LoAD subsystems. The exoatmospheric defense system concept is another high-thrust systems effort within STP. The exoatmospheric defense system involves long-range interceptors which employ multiple optically homing, nonnuclear kill vehicles. Exoatmospheric BMD has been synthesized into a system (layered defense) that provides cost-effective defense of fixed sites against large threats. The STP will continue to validate the technology sociated with exoatmospheric defense in order to provide robust BMD options to counter the large threat levels projected r the early 1990's. In FY 1983, the Homing Overlay experiment (HOE) program, which will demonstrate excatmospheric optical homing and nonnuclear kill, will conduct the last two of four planned flight tests.
- G. (U) RELATED ACTIVITIES: The BMD Systems Technology Program is fully coordinated with related programs being sponsored by other Army, other DOD, and other Government agencies. Included are the Army Materials and Mechanics Research Center (PE 6.11.02.A), Army Missile Intelligence Agency, and Air Force Advanced Strategic Missile Systems program (PE 6.33.22.F). Every effort is made to prevent duplication of effort through automated literature searches, coordination meetings, memorandums of agreement, etc.
- H. (U) WORK PERFORMED BY: Major contractors include: McDonnell Douglas Astronautics Company, Huntington Beach, CA; Lockheed Missile and Space Co., Sunnyvale, CA; Teledyne Brown Engineering Co., Inc., Huntsville, AL; Raytheon Company, Wayland, MA; Martin Marietta Aerospace Corporation, Orlando, FL; Kaman Sciences Corp., Colorado Springs, CO; and General Electric Co., Syracuse, NY. Supporting government agencies include: Army Materials and Mechanics Research Center, Watertown, MA; US Army Missile Command, Huntsville, AL; Picatinny Assenal, Dover, NJ. The developing organization responsible for the program is the Ballistic Missile Defense Systems Command, Huntsville, AL.

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Program Element: #6.33.08.A Title: Ballistic Missile Defense Systems Technology Program

DDD Mission Area: #121 - Ballist' Missile Defense Budget Activity: #3 - Strategic Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: By Congressional direction, the Site Defense program was recriented in 1975 from prototype demonstration to system technology advancement. The new program was designated the BMD Systems Technology Program (STP) with a mission to develop technological solutions to key system issues and to investigate BMD systems capable of defending a wide variety of US strategic targets, with primary emphasis on defense of land-based ICBM's. The STP continued limited design and development of Site Defense hardware/software, installed the Site Defense radar and a commercial data processor at the Kwajalein Missile Range (KMR), and conducted a series of full-scale technology validation tests at the KMR which were completed in FY 1980. These validation tests were highly successful and demonstrated solutions to major critical issues associated with terminal defense, to include bulk filtering, discrimination, realtime software, and operation from dormancy. During this period, the LoAD system was a fined, a contractor development team was selected, and a prototype demonstration (PPD) program was initiated to technically validate the system. System design was initiated and is continuing on the major LoAD subsystems (interceptor, radar, and data processor). Although the PPD program was structured for the development of a generic LoAD system, the LoAD design was driven largely by compatibility requirements with deceptively based MX. With cancellation of the multiple protective shelter (MPS) hasing scheme for MX, the LoAD system is being reoptimized to defend fixed, nondeceptive-based ICMB's. The Homing Overlay Experiment (POE) was initiated in FY 1978 with the objective to demonstrate exoatmospheric optical homing and nonnuclear kill in a full-scale flight test environment. A series of four HOE flight tests will be conducted at Kwajalein Missile Range (KMR). The HOE preliminary design review was conducted in FY 1980. In FY 1981, the HOE critical design review was conducted, the first complete intercepter ground test was empleted, the flight-one intercepter flight test hardware procurement was initiated, advanced data processing hardware configuration experiments were continued, fabrication and assembly of flight-one ground support equipment were completed, and construction of facilities at KMR was completed. Also in FY 1981, an X-band Signature Measurement Radar was installed at the KMR and is successfully collecting data on ICBM targets of opportunity. This is the first step in accumulating an X-band data base for use in current and future RMD radar designs. Studies were continued on the examination of potential BMD systems for the 1990's, with an objective to establish BMD system characteristics for defending ICBM's and other high-value targets.
- 2. TY 1982-FY 1984 Program: The LoAD System concept will be optimized for defense of silo-based ICBM's, and system design will be accelerated to support the option for a deployment decision in 1984. The LoAD system design review will be conducted in September 1982. Detailed design and component development and testing will be accomplished on major LoAD subsystems, to include the radar; data processor; interceptor; transporter; command, control, and communications; and

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Program Element: #6.33.08.A Title: Ballistic Missile Defense Systems Technology Program

DOD Mission Area: #121 - Ballistic Missile Defense Budget Activity: #3 - Strategic Programs

physical site security. Critical engineering data needed to support LoAD long-leadtime operational requirements such as manpower acquisition, testing, training, and logistics support will be developed. On the BOE program, design verification testing will be completed on all hardware components, and system integration testing will be completed on the ground support unit. In addition, fabrication, assembly, and test of the BOE program interceptors will be completed, and all four flight tests will be conducted over FY 1982-1983, with the first test scheduled for Concept refinement, system design studies, and resolution of key issues associated with exoatmospheric defense will continue, in order to maintain outyear options for a development decision. The definition of BMD systems for the 1990's will continue with particular emphasis on the development of system characteristics for ICBM defense and high-value target defense.

3. (y) Program to Completion: This is a continuing program.

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.24.A

DOD Mission Area: #211 - Direct Fire Combat

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

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	22731	6569	1981	1967	0	205527
	QUANTITIES						
D336	Heavy Antitank/Assault Weapon System (TOW)	22731	6569	1981	1967	0	205527

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) antiarmor capability. The 10W complements the other antiarmor weapon systems; i.e., tinks, DRAGON, and LAW, to provide the Army and Marine Corps an in-depth capability to defeat enemy armor forces. Without the TOW, the infantry and mechanized forces will not have a long-range antiarmor capability. Improvements are currently in process to improve the performance of TOW against advanced enemy armor.

C. (U) BASIS FOR FY 1983 RDTE REQUEST:

1. (U) Begin RDTE effort to develop software to integrate TOW Test Measurement and Diagnostic Equipment (TMDE) with the Electronic Quality Assurance Test Equipment (EQUATE).

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Program Element: #2.37.24.A DOD Mission Area: #211 - Direct Fire Combat

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

The \$205.5 million includes all Research and Development (R&D) costs from the TOW program inception. Current R&D improvements will prolong the life of TOW through the mid-90's when a third-generation weapon system is scheduled to replace it.

Milestone Dates Current Major Milestones Milestone Dates Shown in FY 1982 Submission 3Q & 1 3Q81

5" Improved Warhead IOC 6" Warhead IOC

Electro-Optical Countermeasure

Hardening IOC

Change of milestone dates for 6" warhead 10C and electro-optical countermeasures hardening 10C from ted from revised estimates of time required to procure production lead materials. Revised IOC's remain within originally

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	22731	6569	1981	1967	205527
Funds (as shown in FY82 submission)	20735	6588	0	0	199976

Increase of \$1996 thousand in FY81 funding level i. a result of reprograming to complete the Development and Operational Testing of TOW-2. The funding decrease of \$19 thousand in FY82 is a result of the amended budget request and the application of revised inflation and civilian pay pricing indices. The funding increase of \$1981 thousand in FY83 is a result of new effort to develop software to integrate TOW THDF with new LGEATE system. The funding increase of \$1907 thousand will complete development of software to integrate TOW TMDE with the FRI ATE system.

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Program Element: #2.37.24.A

DOD Mission Area: #211 - Direct Fire Combat

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

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

		FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
,	Missile Procurement, Army (MIPA) Funds (current requirements)	849 99	97100	145200	223900	513300	1985899
	Funds (as shown in FY82 submission)	80000	96600	100100	-	TBD	TBD
	Quantities (current requirements)	12000	12000	12000	1 8000	37510	224578
	Quantities (as shown in FY82 submission)	12000	12000	12000	-	TBD	TBD

Increase of \$4999 thousand in the FW81 runding level is a result of reprograming within the program element to achieve desired production of TOW missiles. The funding increase of \$500 thousand in FY82 is a result of the amended budget request and the application of revised inflation and civilian pay pricing indices. The funding increase of \$45100 thousand in FY83 is a result of POM o budget adjustments and the application of revised inflation and civilian pay pricing indices. The above data lists the new procurement program for I-TOW (Improved 5" warhead) and TOW-2 (6" warhead and guidance hardening). Not included is the funding program to retrofit the current inventory of missiles to the I-TOW and TOW-2 configurations and to retrofit launchers to TOW-2 configuration. The retrofit programs are shown below:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Modifications Funds (current requirements)	99601	124300	58400	66100	17400	399501
Funds (as shown in F782 submission)	104600	107500	58900	-	TBD	TBD

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Program Element: #2.37.24.A

DOD Mission Area: #211 - Direct Fire Combat

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Missiles						
Quantities (current requirements)						
1-TOW (improved 5")	18000	0	0	0	0	30940
TOW-2 (6")	0	9490	0	0	0	9490
Quantities (as shown in FY82 subm	ission)					
I-TOW (improved 5")	18000	0	0	_	TBD	TBD
TOW-2 (6")	0	9490	9490	-	TBD	TBD
Launchers					e e	
Quantities (current requirements) Quantities (as shown in FY62	1005	1852	1427	1750	478	65}?
submission)	Not	Not	Not	Not	Not	Not
•	Shown	Shown	Shown	Shown	Shown	Shown

Decrease of \$4999 thousand in the FY81 funding level is a result of reprograming within Program Element to achieve desired production of TOW-2 missiles. The funding increase of \$16800 thousand in FY82 is a result of the amended budget request and the application of revised inflation and civilian pay pricing indices. The funding decrease of \$500 thousand in FY83 is a result of POM to budget adjustments and the application of revised inflation and civilian pay pricing indices. Decrease in retrofit of 9490 missils in FY83 is a result of restructuring within program element to allow for modification of desired amount of launchers.

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Program Element: #2.37.24.A

DOD Mission Area: #211 - Direct Fire Combat

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

perailed background and description: The Tow (Tube-launched, Optically tracked, Wire-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 creat portable and can be employed on the ground or mounted on a variety of military vehicles. The missile can be fired from hei/coptors 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 2.37.2..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 Mil3Al armored personnel carrier has been fielded to provide a TOW crew with armor protection and tracked vehicle mobility (Improved TOW Vehicle, ITV, M901 PE 6.36.26.A). The TOW System is also being mounted on the COBRA helicopter (PE 6.42.12.A) and Fighting Vehicle Systems (PE 6.46.16.A and 6.46.29.A.). There is no unnecessary duplication of effort within the Army or Department of Defense on the TOW program.
- 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 Project Manager, US Army Missile Command, Huntsville, AL.

Program Element: #2.37.24.A

DOD Mission Area: #211 - Direct Fire Combat

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

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: The basic weapon system development is completed, and first units were fielded in 1970. A competition for the night sight ED between Texas Instruments (T1) and Hughes Aircraft Company was won by T1. The TOW Manportable Common Thermal Night Sight (MCTNS) entered production in 1979. Nine night sights were fabricated during Research and Development Acceptance Testing (RDAT) conducted in March 1975. A solid state track link (SSTL) electronic counter-countermeasure (ECCM) development program was completed in FY 1977 to provide TOW with a low susceptibility to electronic countermeasures (ECM). The SSTL program was terminated in FY 1977 when it was determined that the SSTL beacon-tracker data link would not match the performance of the night sight (AN/TAS-4) in penetrating battlefield obscurants (smoke, dust, etc.). During FY80, the accelerated program to improve the warhead lethality by retrofitting both a probe (to increase warhead functioning standoff distance) and an improved warhead using antiarmor warhead technology developed in the HELLFIRE and VIPER programs continued. Fairchild was selected to produce the probes for the TOW missiles. The first improved five-inch varhead was produced by the Jowa Ammunition Flant. The ITOW missile achieved IOC in April 1981, within cost and on schedule. DT/OT II for TOW-2 was completed in July 1981 and resulted in decisions to type classify TOW-2 as standard and proceed with production of TOW-2 missiles and modification of launchers and basic missiles.
- 2. (U) FY 1982 Program: Finalize RDTE efforts on TOW-2 guidance link and EOCM hardware. Produce six-inch warhead missiles and launcher modification kits; begin retrofitting existing launchers.
- 3. (U) FY 1983 Planned Program: Continue retrofitting launchers to TOW-2 configuration and produce new six-inch missiles. Begin RDTE effort for development of TMDE software to interface TOW-2 with EQUATE. This effort is necessary to insire that TOW TMDE will be compatible with future Army field maintenance support equipment. This is a two-year effort.
- 4. (U) FY 1984 Planned Program: Continue retrofitting launchers to TOW-2 configuration and produce new six-inch missiles. Finalize RDTE effort for TMDE software to interface TOW-2 maintenance equipment with EQUATE. Begin procurement of launchers for HMMV.
- 5. (U) Program to Completion: All 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.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.26.A

DOD Mission Ares: #212 - Indirect Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 2129	FY 1982 Estimate 5958	FY 1983 Estimate 7224	FY 1984 <u>Estimate</u> 28446	Additional to Completion Continuing	Total Estimated Cost Not Applicable
D322	Advanced Field Artillery Tactical Data System	2129	5958	7224	28446	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, a successor system development is required to provide the capability to the field artillery to defeat the threat envisioned for the late 1990's. This new system must provide for improved communications management, distributed processing capability at remote locations, and increased system mobility and survivability. The new system will take full advantage of new 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 will 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) PASIS FOR FY 1983 REQUEST:

1. (U) The system engineering contractor will complete the remote terminal subsystem functional analyses and specifications. Fabrication of the brassboard models of the Communications Control Subsystem (CCS) will be completed.

Development of system-level software for the testbed tests of the CCS will be completed. The CCS testbed evaluation will be completed.

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Program Element: #2.37.26.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: 34 - 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 are adequate to support the proposed developments. In-depth cost analysis for each subsystem will be performed during the first year of the design effort.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Mission Elerent Need		
Statement Approved	2081	2081
In-Process Review (IPR) (CCS)	4081	3081
Contract Award	3082	4081
Development Test (DT)/	•	·
Operational Test (OT) II	3Q86	30.86
Development Acceptance	- •	• • •
In-Process Review (DEVA IPR)	4Q86	4086
Initial Operational	•	•
Capability (IOC) (CCS)	3Q88	3Q88
Army Systems Acquisition		
Review Council I (ASARC)		
(Remote Devices)	3Q83	30,82
Contract Award	1084	40.82
DT/OT II	4Q88	3Q87
ASARC III	1089	4Q87
IOC (Remote Devices)	1091	3Q90
ASARC I (Fire Direction		
Center (FDC) Upgrade)	3083	3082
Contract Award	1Q85	1085
DT/OT II	4Q88	3088

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Program Element: #2.37.26.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
ASARC III (FDC Production		
Decision)	1089	4Q88
lOC (FDC Upgrade)	1091	3090

(U) The Communication Control Subsystem In-Process Review and Contract Award were delayed because of late approval of the requirements document and late preparation of the development plan. The test and Initial Operational Capability (IOC) dates will still be met. The decision points, testing, and IOC of the remote devices and fire direction center have been aligned due to their interdependence. The Army Systems Acquisition Review Council I (ASARC) was delayed one year due to a reduction in funds available in FY 1983.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	2129	5958	7224	Continuing	Not Applicable
submission)	3529	5976	12165	Continuing	Not Applicable

(U) The FY 1981 funds were reduced through a reprograming action due to the late approval of the Mission Element Need Statement and late award to the Integration, interoperability, and Configuration Control contract. The FY 1982 fund reduction is a result of inflation adjustments. The FY 1983 funds were reduced to fund higher priority programs during the FY 1983 budget process.

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Program Element: #2.37.26.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: 44 - Tactical Programs

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	-	-	-	-	763000	763000 <u>1</u> /
Funds (as shown in FY 1982						
submission)	-	-	-	-	763000	763000
Quantities (current requirements)	-	-	-	-	139	139 1/
Quantities (as shown in FY 1982 submission)					120	120
Submission)	-	-	-	-	139	139
Military Construction, Army						
Funds (current requirements)	-	-	-	-	3400	3400 2/
Funds (as shown in FY 1982						
submission)	-	-	-	-	3100	3100

1/ (U) 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 Field Artillery Tactical Data System Software Support Group at Ft. Sill, OK. The increase is due to inflation.

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Program Element: #2.37.26.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: \$4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Army is fielding the 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 is to 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 fielded 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 system to improve the current TACFIRE's tactical communications net management capabilities until the successor system can be fully 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 maneuver force 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 into vehicles common to the supported forces. When completed, the replacement system will be entirely new, utilizing proven applications software evolved from the current 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.

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Program Element: #2.37.26.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: #4 - Tactical Programs

- G. (U) RELATED ACTIVITIES: The following provides information on current US and foreign development efforts which may be applicable to this program:
- 1. (U) A standard, 32-bit militarized computer is being developed in Program Element (PE) 6.27.46.A, Tactical ADP Technology, Project A094Q0, Military Computer Family, and PE 6.37.23.A, Command and Control, Project D186, Military Computer Family. This computer is scheduled to enter production in FY86 and, if available, will be used as the processor for the new system. Since no central processing unit will be developed under this PE, duplication of effort cannot occur.
- 2. (U) A Department of Defense standardized software language, Ada, is being developed in Program Element 6.37.23.A, Command and Control, Project D185, Military Software Standardization. Ada will be used in all software programing.
- 3. (U) The Marine Corps is developing the Marine Integrated Fire and Air Support System (MIFASS). Because of differences in doctrine and operational procedures, the total Marine Corps System is not expected to satisfy Army requirements. Components of MIFASS will be evaluated by the Army, however, to determine whether these components 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 the is unsuitable for US Army needs, subsystems of these systems will be evaluated for potential use. Duplication will be avoided by frequent visits between offices, and analysis of technology and hardware as it is developed.
- H. (U) WORK PERFORMED BY: The system design and support contract was awarded to Calculon Corporation in September 1981. It is planned to competitively award separate contracts for the development of each of the subsystems and for verification and validation. The in-house developing agency is the US Army Communications Electronics Command (CECOM), Ft Mommouth, NJ.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: The Advanced Field Artillery Tactical Data System program began in FY81. A systems engineering contract was 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 interface requirements. The

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Program Element: #2.37.26.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Field Artillery Tactical Data System
Budget Activity: \$4 - Tactical Programs

contractor will prepare technical documentation for individual subsystems, starting with the subsystem for communications control.

- 2. (U) FY 1982 Program: The systems contractor will continue to analyze user needs, concentrating on the detailed functional characteristics of new intelligent terminals to improve system responsiveness to the commander's needs. The communication control subsystem contractor will begin assembly of a brassboard model to be incorporated in testbed tests planned for mid-FY83. System software modifications will be initiated to provide a user testbed evaluation. A contract will be awarded for a software verification and validation effort.
- 3. (U) FY 1983 Planned Program: Fabrication of the brassboard models of the Communication Control Subsystem (CCS) and development of the system-level software for the testbed will be completed. The CCS testbed will be conducted, and the results analyzed. Engineering design specifications for the engineering development models of the CCS will be completed. The system engineering contractor will complete the remote terminal subsystem functional analyses and specifications, and conduct a preliminary evaluation of software system design. Action will be initiated to procure Military Computer Family processors for use in the remote subsystem software development. 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.
- 4. (U) FY 1984 Planned Program: The CCS will enter Engineering Development. The contract for the Fire Support Officer device and FIST Team Chief Remote Intelligent Terminals will be awarded. The TACFIRE application software conversion to the standard DOD programing Language (Ada) for AFATDS will be initiated. The Fire Direction Center (FDC) subsystem requirements will be completed, and procurement action for an FY85 development start will be initiated.
- 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 advanced system to allow it to be fully responsive to the user's projected needs into the 21st century. E.:h of the improvements will be thoroughly tested with the user at Ft Sill in a testbed of operational and brassboard hardware and software. 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 interpoperability testbed for automated systems at Ft Hood. The CCS is planned to be fielded in FY 1988. The remote devices and FDCs will be fielded in FY 1991.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.30.A

LOL Mission Area: #222 - Ground-Based Antiair and lactical Missile Defense

Title: CHAPARRAL

Budget Activity: 16 - Tactical Programs

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

Project		FY 1981	FY 1962	FY 1983	FY 1984	Additional	Total Estimated
Number	Title	Actual	Estimate	Istimate	lati ite	to Completion	Cost
	TOTAL FOR PROGRAM ELEMENT	22908	19616	26381	54515	27996	212066
	QUANTITIES						
	Fire Units Missiles					72	235
D697	Chaparral	23005	19616	26201	24511		
ע פטע	CHAPARKAL	22908	13010	26381	24518	12250	196326

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the development of mission, weapon system and ground support equipment improvements for the CHAPARRAL weapon system. CHAPARRAL is a short-range air defense (SHURAD), surface-to-sir missile system. It is a highly mobile self-propelled system. The missile is lightweight supersonic, passive infrared homing, fire-and-forget. 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, and it is the only SHORAD missile system in the field. It provides air defense for infantry, mechanized infantry and armor divisions and for theater/corps rear areas. CHAPARRAL will be retained in the Army's active inventory through the 1990's. To enable CHAPARRAL to meet the postulated threat through the 1990's, critical system improvements which include the capability to engage targets at night and to engage targets are required.

BASIS FOR FY 1983 RDTE REQUEST: Funds are requested to continue the development of an improved Rosette Scan Seeker (RSS) guidance section for the ChaPARRAL missile, initiate development of a Nuclear, Biological, and Chemical (NBC) Collective Protection System for the crew and initiate development of a Weapon Display Unit (WDU). The improved, RSS

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Program Element: #2.37.30.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Detense

Title: CHAPARRAL Endget Activity: #4 - Tactical Programs

Missile will enable CHAPARRAL to operate against the
The Weapon Display Unit (WDU) will provide the gunner target alerting and cueing information from the forward area SHORAD command and control system.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1962 Submission
CHAPARK : RDTE Program Initia ed	February 1965	February 1965
Initial Operational Capability	November 1969	hovember 1969
System Type Classified	November 1970	November 1970
Improved ChAPARRAL Missile (less smokeless motor) Type classified standard	November 1974	November 1974
Initiated Identification, Friend or Foe (IFF) Development	July 1975	July 1975
Initiated Smokeless Motor Development	November 1975	November 1975
1FF Approved for Production	September 1977	September 1977
Smokeless Motor Approved for Production	harth 1980	March 1980
Initial Operational Capability (IOC) for Improved CHAPARKAL Missile (less Smokeless	1QFY1979	1QFY1979

Program Element: #2.37.30.A

DOD Mission Area: 122. - Ground Based Antiair and Tactical Missile Defense

litle: CHAPARRAL

Budget Activity: #4 - Tactical Programs

Motor)

Current Milestone Dates Major Milestones Milestone Dates Shown in FY 1982 Submission Initial Operational Capability 1QFY1982 1QFY1982 (10C) Smokeless Notor 10C Identification Friend 2QFY1981 2QFY1981 or Foe (1FF) 10C Forward Looking 2QFY1983 20FY1983 Infrared (FLIR) Subystem Initial Operational Capability (IOC) Rosette Scan Seeker (RSS) hissile

The projected IOC for the RSS Missile (improved IR only guidance missile) slipped due to its development start being delayed. The development start was delayed to allow analysis of a proposal to develop a radio frequency/infrared (RF/IR); missile to provide CHAPARRAL an all-weather capability against cooperating targets; i.e., targets emitting RF energy, such as navigational aids. Analysis indicated: (1) acquisition cost of an RF/IR missile would be at least double that for an RSS missile; (2) it would require two years longer to develop an RF/IR missile; (3) the RF/IR missile would not significantly increase the number of targets CHAPARRAL would engage in the forward (Divisional) area. The Army will complete analysis of competing RSS alternatives and provide guidance for initiation of the missile guidance development program in early 1982.

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Program Element: #2.37.3U.A

DOD Mission Area: #222 - Ground-Based Antiair and lactical Missile Defense

Title: CHAPARRAL

Budget Activity: #4 - Tactical Programs

COMPARISON WITH FY 1982 RUTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1963	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	22908	19616	26381	36768	196320
Funds (as shown in FY 1962 submission)	23172	20074	14617	14465	162975

Application of new inflation indices caused a decrease in previou, funding estimates for FY81, FY82, and FY83, Additional To Completion, and Total Estimated Cost. The increase in funds required reflected above for FY83 resulted from the funding of two previously unfunded Product Improvement Proposals (PIP's) and an increase in tunds required to continue Rosette Scen System and the Weapon Display Unit. The increase in the funds required to continue the RSS Missile development was caused by delays in initiating the development effort. The increases for Additional To Completion and Total Estimated Cost funding include funds required to complete development of the NBC Collective Protection System, Meapon Display Unit, and RSS Missile and to develop additional (classified program) with FY83 and FY84 fund-

Program Element: #2.37.30.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile belonse

Title: CHAPARRAL.

Budget Activity: \$4 - Tactical Programs

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

(U) OTHER APPROPRIATION FUNDS: (\$ in thousands)						Tota
	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Estimated Cost
Missile Procurement, Army; CHAPARRAL (MIM-72-A/C)	43800	4300	0	0	793400	1311900
Funds (current requirements) Funds (as shown in FY 1982 submission)	44400	4400	4500	~	14100	536900
Quantities (current requirements) Missiles	0 .32	0	0	0	6645 O	19965 532*
Quantities (as shown in FY 1982 submission) Missiles Fire Units	0 32	o 0	0	0 ~	0	13320 532*
Missile Procurement Army; CHAPARRAL Modifications	42300	89500	37600	13600	22200	258900
CHAPARKAL MODIFICATION Funds (current requirement) Funds (as shown in FY 1982 submission)	42900	65700	4100	<u>-</u>	6100	172900

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Program Element: #2 37.30.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

- 1. Explanation, changes in Missile Procurement, Army; CHAPARRAL (MIM-72-A/C). Application of new inflation indices decreased previous estimates for funds required for FY61 and FY82, Additional To Completion, and Total Estimated Cost. The elimination of funds required for FY63 and FY84 resulted from shifting funding for Smokeless Rocket Motors within the budget to the modifications line. The increase in Additional To Completion and Total Estimated Cost includes FY85 thru FY67 funding for procurement of 6645 Rosette Scan Seeker (RSS) Missiles,
- 2. Explanation, Changes in Quantities. Addition of missiles shown in Additional to Completion and Total Estimated Cost columns reflects the procurement of
- 3. (U) Explanation, changes in Missile Procurement, Army; CHAPARRAL Modifications. Application of new inflation indices caused a decrease in previous estimates for funds required. The increase in FY82 funding supports a classified program. The increase in funding for FY83 results from funding procurement of additional Forward Looking Infrared (FLIR) Night Sights, Smokeless Rocket Motors, and new rocket motor insulation kits. The increase in FY84 funding includes new funding for Smokeless Rocket Motors, rocket motor insulation kits and additional funding for modified air compressors. The increase in Addition 10 Completion funding reflects approval of and funding for the following Product Improvement Proposals (PIPs): Rear Compartment Cooling, Master Control Indicator, Nuclear, Biological, Chemical (NBC) Collective Protection and Fault Isolation modifications. These modifications will improve CHAPARRAL reliability and maintainability. The increase reflected in Total Estimated Cost includes funding increases identified for FY83, FY84, and Additional To Completion.

Program Element: #2.37.30.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

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 system: 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 HIM-72A Basic or HIM-72C Improved CHAPARRAL missile (derivative of the Navy SIDEWINDER IC 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, had several recognized limitations including a tail-chase-only engagement capability,

a low-lethality warhead and a heavy smoke trail. The MIM-72C Improved CHAPARRAl missile was developed to

a low-lethality warhead 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 motor 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 Directional Dopler (DIDO) fuze has much

and coupled with the new warhead, provides increased lethelity 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 moveable 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 CLM-PARRAL missiles. The basic CLM-PARRAL system relied on visual target identification. A crypto-secure Mark XII, Identification Friend or Foe (IFF) set was developed and fielded with an IOC in Second Quarter FY 1981 to assist the gunner identify friendly aircraft. However, ChAPARRAL 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

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and hit was

Program Element: #2.37.30.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: CHAPARRAL
Budget Activity: #4 - Tactical Programs

alleviate this limitation. The Foward Looking Infrared (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 through the 1990's and that the a Rosette Scan Seeker guidance concept should be incorporated in the CHAPARRAL missile to enable it to operate against the

A development effort for this improvement should be initiated in FY 1962.

- G. (U) RELATED ACTIVITIES: ROLAND (Program Element 6.43.09.A), STINGER (Program Element 6.43.06.A), Division Air Defense (DIVAD) Gun (Program Element 6.41.31.A) and Lightweight Air Defense System (LADS) (Program Element 6.33.23. are complementary p programs. Duplication of effort is avoided by CHAPARRAL project office coordination with the Naval Weapons Center, China Lake, CA, developer of the SIDEWINDER missile, the US Army Missile Command Laboratories, which maintain cognizance of Army and other Service programs, and through coordination with the STINGER, ROLAND, and DIVAD Gun 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 contracted to Raytheon, bedford, MA. The Improved Chaparral Missile (MIM-72C) was developed and procured through Ford Aerospace. The contractor for the Chaparral missile, M730, which is provided as government-furnished equipment to Ford Aerospace, is Food Machinery Corporation (FMC), San Jose, CA. Ford Aerospace is the prime contractor for the FLIR with Texas Instruments Incorporated, Dallas, TX, a major subcontractor. The US Army Missile Command, Huntsville, AL, is the in-house developing organization responsible for the program.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1961 and Prior Accomplishments: Chaparral development began in February 1965. The first tactical Chaparral unit was deployed in vovember 1969 and the system was type classified standard in November 1970. An Improved Chaparral missile was developed to alleviate limitations of the basic missile, limitations known at the time the system was fielded. The improvements incorporated into the improved Chaparral missile are the all-aspect AN/DAW-1 guidance section, Directional Loppler (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. The TAA effort was the foundation for development of infrared common modules. The common modules are the

Program Element: #2.37.30.A

the European environment.

D)D Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: CHAPARRAL

Budget Activity: #4 - Tactical Programs

bases of the Forward Looking Infrared (FLIR) Night Sight developed for CHAPARRAL. The AN/DAW-1 guidance section of the improved missile, as originally designed, In 1975 the US Army Missile Command (MICOM) conceived and evaluated a fix designated GOLDEN, which provided a significant capability against

Following a firing program and refinement of the design, GOLDEN was incorporated into the improved missile through engineering change proposal, and improved Chaparral missiles incorporating GCLDEN were fielded in 1979. An identification Friend or Foe (IFF) Development program began in July 1975. The development concept called for integration of the IFF interrogator and programer developed for STINGER, with an antenna, electronic controls and interconnections developed especially for the Chaparral fire unit. The IFF was type classified standard and approved for production in September 1977. Procurement began in FY 1979. A development program for a Smokeless Rocket Motor was initiated in November 1975 and completed in February 1980. Production of this motor began in March 1980. During the FY 1977 budget hearings, the Army was directed by Congress to initiate an adverse weather Chaparral demonstration program to provide a hedge against ROLAND technical and funding problems. The program was successfully completed on schedule in July 1978. The FY 1980 and 1981 programs focused on the development of a night firing capability, the Forward Looking Infrared (FLIR) Night Sight, for Chaparral. The current system is limited by the ability of the gunner to visually detect the target. This limitation will be alleviated by the FLIR. FLIR will provide the gunner day, night, and some adverse weather target acquisition capability. The FLIR Night Sight will allow Chaparral to operate in excess of 852 of the time in

- 2. (U) FY 1962 Program: The development and testing effort for the Foward Looking Infrared (FLIR) Night Sight will be completed and a contract to purchase FLIR Night Sights will be awarded. A development program will be initiated for a Rosette Scan Seeker (RSS) guidance section for the CHAPARRAL Bissile. Contractor design and development efforts will be iniaited. Long-lead hardware will be procured for the fabrication of 72 test missiles. The Government will initiate the development of test plans and perform initial component and subsystem-level testing.
- 3. (U) FY 1983 Planned Program: The design and development of the RSS Guidance Section will be continued. Contractor testing of breadboard hardware will be initiated. Development will be initiated for a Weapon Display Unit (WDU) and Nuclear, Biological, Chemical (NBC) Collective Protection System. Hardware Design will be completed and prototype hardware fabrication will be started. The Government will determine logistic support requirements, which includes the maintenance concept, repair parts and test equipment requirements, for the WDU and NBC Collective Protection Systems.

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Program Element: #2.37.30.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: CHAPARRAL

Budget Activity: #4 - Tactical Programs

- 4. (U) FY 1964 Planned Program: Prototype Rosette Scan Secker (RSS) guidance sections will be manufactured. These guidance sections will be subjected to environmental testing, infrared sensitivity, captive flight, ground-to-air, and SLED tests. Manufacture of guidance sections to be used in the Government lest Program will be started. The Weapon Display Unit (WDU) and Nuclear, Biological, Chemical (NBC) Collective Protection System development, begun in FY83, will be completed. Prototype system hardware and test equipment will be fabricated. Draft manuals and documentation will be delivered. Development/Operational Testing will be conducted. Engineering Change Proposals (ECP's) for the WDU and NBC Collective Protection PIP's will be approved so that procurement can be initiated for kits in early FY85.
- 5. (U) Program to Completion: Contractor will complete testing of RSS Missiles and deliver missiles for Government environmental and flight tests. The contractor will also complete the Technical Data Package and prepare the Engineering Change Proposal for submission to the Government.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37 31.A

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

Budget Activity: #4 - Tactical Programs

DUD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
TOTA	L FOR PROGRAM ELEMENT	9481	394 15	37971	27125	17632	316241
	OUANTITIES Missiles/Ground Support Equipment Sets						55/2
	ace-to-Air Missile HAWK/HAWK Improvement Program (SAM HAWK/HIP)	9481	39435	37 171	27125	17632	316241

- 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 threat of the late 1980's.
- C. (U) BASIS FOR FY 1983 RDTE REOUEST: Funds in the amount of \$37.971 million are required in FY83 in support of upgrading the Improved HAWK Missile System. Continue development and testing of the missile's ability to counter the Multiple Blinking Jammer (MBJ) and continue development of the Phase III PIP's.

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Program Element: #2.37.31.A

Title: Surface-to-Air Missile hAWK/HAWK Improvement

Program (SAM HAWK/HIP)
Budget Activity: #4 - Tactical Programs

DOD Mission Area:

#222 - Ground-Based Antiair and lactical Missile Defense

Current

Milestone Dates

Major Milestones

Milestone Dates

Shown in FY 1982 Submission

Engineering Development Contract Awarded

November 1964

November 1964

Initial Operational Capability

November 1972

November 1972

D. (U) COMPARISON WITH FY 1962 RDTE REQUEST (\$ in thousands)

	FY 1981	FY 1962	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	9481	39435	37971	44757	316241
Funds (as shown in FY 1962 submission)	7482	39558	36607	42946	313358

The change in Total Estimated Cost between FY82 to FY83 submissions is \$2.9 million. Breakout is as follows: Increase of \$1.999M in FY61 caused by reprograming to accelerate development of the Multiple Blinking Jammer (MBJ) PIP. Decreases of \$0.123 million in FY62 and \$0.636 in FY63 are due to inflation adjustments. Increase of \$1.611 million for "additional to completion" (FYE4-86) is due to deletion of the Continuous Wave (CW) Antiradiation Missile (ARM) PIP and replacing it with the Improved Continuous Wave Acquisition kadar (ICWAR) All-Range Processor PIP. "Total Estimated Cost" may increase. Based on a 20 Jan 82 Army decision to retain a portion of the 1HAWK force indefinitely, additional RUTE requirements for FY84 and beyond will be evaluated. A determination will be made of what evolutionary changes are required beyond the Phase III improvements.

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Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/HAWK Improvement
Program (SAM HAWK/HIP)
Budget Activity: #4 - Tactical Programs

LOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

OTHER APPROPRIATION FUNDS: (\$ in thousands)

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional lo Completion	lotal Estimated Cost
Missile Procurement, Army:						
Funds (current requirements)	10000	4800	4000	9700	10000	1006600
Funds (as shown in FY 1982 submission)	10000	4700	4100	Not Shown	8400	996260
Quantities						
Missiles/General Support						
Equipment Sets (current						
requirements)	197/0	0/0	0/0	6/0	0/0	5326/98*
Missiles/General Support						
Equipment Sets (as shown						
in FY 1982 submission)	197/0	0/0	0/0	Not Shown	0/0	5328/98
W1314 C 1						
Military Construction, Army:	•	U	4.	•	^	1266
Funds (current requirements) Funds (as shown in FY 1982	v	U	U	0	0	1360
submission)	0	6	0	0	O	1300
enneronion)	v	•	•	v	U	1 200

^{(1) (}U) Changes in FY82 and FY83 due to inflation adjustments.

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⁽²⁾ Change in FY84 "Additional to Completion" and "Total Estimated Cost" is due to the inclusion of additional rocket motors to adequately support the missile reliability and restoration program. On 20 January 1982, the Army decided to

Program Element: #2.37.31.A

Title: Surface-to-Air Missile hAWK/HAWK Improvement
Program (SAM HAWK/HIP)
Budget Activity: \$4 - Tactical Programs

DOD Mission Area: \$222 - Ground-Based Antiair and Tactical Missile lietense batteries indefinitely. The need for additional rocket motors beyond what is programed retain a minimum lHAWK force of

* FY81 completed US Army procurement of lhAWK missiles. Funding identified FY82 thru completion will provide for rocket motor replacement.

Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/HAWK Improvedent

Program (SAM HAWK/HIP)

DOD Mission Area: #222 - Ground-Based Antiair

and Tactical Missile Defense

Budget Activity: #4 - Tactical Programs

- DETAILED BACKGROUND AND DESCRIPTION: Technical assessments and operational testing confirmed the deficiencies of the Basic HAWK System in meeting the air threat. Consequently, a HAWK Improvement Program 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 improvements provided 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 builtain test equipment and to achieve compatibility with the new missile and computer. A Product Improvement Program (PIP) was initiated in FY/3. 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. A follow-on set 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 mission requirements 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 joint attendance at scientific meetings and program reviews. 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 and European industry to convert their HAWK assets to the Improved System. Under the US-Japan Coproduction Agreement, Japan is manufacturing Improved HAWK. With the exception of Belgium, conversion of NATO Basic HAWK to Improved HAWK has been completed. NATO is continuing 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, utilizing contractor and in-house efforts. The prime contractor is Raytheon Company, West Andover, MA. Other contractors are Westinghouse Electric Corporation, Baltimore, MD; Applied Devices Corporation, Kissamee, FL; Northrop Corporation, Anaheim, CA; and Aerojet, Sacramento, CA. Four other contractors are involved at a level of effort of approximately \$1 million during the FY82-83 timeframe.

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Program Element: #2.37.31.A

Title: Surface-to-Air Missile HAWK/HAWK Improvement

Program (SAM HAWK/HTP) Budget Activity: #4 - Tactical Programs

DOD Mission Area: #222 - Ground-Based Antiair

and Tactical Missile Defense

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The initial Operational Capabilities (IOC) date for the first battalion of Improved HAWK 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) upgrading the tactical software and increasing the computer memory of the Automatic Data Processor (ADP) to exchange more target track information in a timely fashion with the AN/TSO-73 Air Defense Command and Control System; and (4) providing each battery with a multichannel communications capability. Delivery on the Phase I PIP's to field units began in FY79. Of special interest is the tactical software. A version of the 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 uplink selective data from both acquisition radars as well as all data from the tracking radars, continued development in FY80. Block II was successfully tested in Europe in 1980, approved for fielding, and a production contract awarded in April 1981. Phase I hardware deliveries were completed in October 1981. Block 11 software deliveries begin in March 1982. A second series of PIP's (Phase II) is focusing on three 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); and (3) enhancing the missile's capability to counter enemy jamming techniques. 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 either as an aid to or in lieu of normal radar tracking. TAS was tested in Europe in FY/8, 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 continued in FY81. The product improvements to the improved NAWK missile performance in an ECM invironment were initiated in FY79 and are continuing. Long-lead items were procured in FYBI. On 15 Apr 80, 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 maximize its capabilities during the transition period of Patriot deployment. The study recommended the development/fielding of six additional improvements called Phase III: (1) giving the IRAWK missile the ability to counter the Multiple Blinking Jammer (MBJ); (2) increasing the

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Program Element: #2.37.31.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: Surface-to-Air Missile HAWK/HAWK Improvement
Program (SAM HAWK/HIP)
Budget Activity: #4 - Tactical Programs

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 to counter Antiradiation Missiles (ARM). 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 was deleted. The Multiple Blinking Jammer (MBJ) PIP development was accelerated from FY82 to FY81 and was incorporated as part of the Phase II Missile ECM upgrade (MEU) effort. As a result of user requirements to transmit uplink accurate and timely target positioning data from the Improved Continuous Wave Acquisition Radar (ICWAR) to the battalion command and control system (AN/TSO-73), a new PIP called the ICWAR All-Range Processor (ARP) was submitted and approved in June 1981. Since all live of the Phase III PIP's are interrelated, all costs and schedules have been integrated into a single program to improve the overall impact of the Phase III capabilities.

- 2. (U) FY 1982 Program: Fielding of the Phase I PIP's completed. Complete design, development, and documentation of the missile ECM upgrade (MEU) improvement. Conduct MEU flight test program to verify that normal missile guidance has not been degraded by incorporation of the new MEU PIP. Award MEU production contract. Conduct testing to validate that the tracking radar's RAM/EMCON PIP and the optical tracking improvements are ready for Army employment. Initiate full-scale development of the Phase III improvements. Procure 288 replacement cocket motors.
- 3. (U) FY 1983 Planned Program: Continue development of the Multiple Blinking Jammer (MBJ) and Phase III Product Improvements. Start fielding of the Phase II Missile ECM upgrade modification. Begin installation of the High Power Illuminator (HP1) Reliability, Availability, Maintainability (RAM/Emission Control (EMCON) and Tracking Adjunct System (TAS) PIP's. Procure 230 replacement rocket motors.
- 4. (U) FY 1984 Planned Program: Award contracts for MBJ and Phase III long-lead factory tooling and test equipment. Procure 541 replacement rocket motors. Determine requirements for evolutionary changes to INAMK beyond Phase III.
- 5. (U) Program to Completion: Conduct flight testing of MBJ modified 1-HAWK missiles. Award production contracts and field MBJ and Phase III modifications. Procure 525 replacement tocket motors. Field evolutionary changes as required.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Combat Vehicle Improvement Program
Budget Activitiy: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 20322	FY 1982 Estimate 2939:	FY 1983 Estimate 46785	FY 1984 Estimate 49637	Additional to Completion Continuing	Total Estimated Cost Not Applicable
DE01	M60Al Tank Product Improvement Program (PIP) Mi Tank improvements	4300 16022	0 2516 8	0 42364	0 42048	0 Continuing	51643 Not Applicable
D332	Fighting Vehicle Improvements		4227	4421	7589	Continuing	Not applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The acceleration of technology and the rapid pace of the Soviet modernization efforts emphasize the need for an evolutionary block improvement program to maintain the Infantry/Cavalry Fighting Vehicles (IFV/CFV) and MI Abrams Tank combat advantage over future Soviet armor. This program provides for early initiation of planned operational performance and reliability, availability, maintainability, and durability (RAM-D) improvements beyond the original performance requirements, responsive to future threat changes, and technology apportunities.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Requested funds will provide for development, engineering, and testing of improvements for the IFV/CFV systems. IFV/CFV improvements include a Chemical/Biological (CB) protection system. Procure hardware for integrating block 1 improvements into five prototype MIE1's. Conduct contractor testing of MIE1. Emphasize MIE1 engineering, production and logistical support planning, and MIE1 DT/OT II preparation.

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Program Element: #2.37.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Combat Vehicle Improvement Program

Budget Activity: #4 - Tactical Programs

Major Milestones IFV/CFV Chemical/Biological Protection System	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Project Initiated	2082	Not Shown Not Shown
Production Decision First Production Delivery	2Q86 3Q87	Not Shown
Ml Tank Improvements		
Block 1	1001	Not Shown
MIEL DT/OT II Complete	4084	Not Shown
Production Decision First Production Delivery	4084 (tentative) 4085	Not Shown
Block 2		N. a. Ohaam
Project Initiation	FY83	Not Shown
First Production Delivery	FY88 (tentative)	FY87
Block 3		N o Chara
Project Initiation	FY85	Not Shown
First Production Delivery	TBD	TBD

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Program Element: #2.37.35.A DOD Mission Area: #211 - Direct Fire Combat Title: Combat Vehicle Improvement Program

Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
Funds (current regulrements) Funds (as shown in FY 1982	2032.	29395	46785	Continuing	Not Applicable
submission)	20631	29485	27661	Continuing	Not Applicable

The FY81 and FY82 decreases result from pricing and inflation adjustments. Increase in FY83 results from M1 block improvement program decisions in FY81 (definition of the Preplanned Product Improvement program (P^3I) and final definition of Block 1 composition).

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

Weapons and Tracked Combat	FY 1981 Actual	Fy 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Vehicles, Army Funds (current requirements)	146300	73700	130600	140100	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	146300	199500	284000	Not Shown	661200	1982000

Note: The decrease in funding estimates for FY81-83 results from delay in purchase of M60 training devices to FY86-87, reduction of M1 improvements from 24 to 13, and program change resulting from September 1981 Army decision.

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Program Element: #2.37.35.A DOD Mission Area: #211 - Direct Fire Combat Title: Combat Vehicle Improvement Program

Budget Activity: #4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The rapid modernization of Soviet Armor forces has virtually eliminated the US qualitative edge. These gains have reduced the US capability to counter 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 and fielding the MI tank and IFV/CFV as soon as possible. Introduction of subsequent combat vehicle operational performance and RAM-D improvements are essential to maintain technological parity for the 1980's and beyond. 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 the logistical burden. The Mi and IFV/CFV Product Improvement Programs (PIPs) will introduce time-phased PIPs to the production lines in groups called "Blocks" to minimize cost while insuring effective configuration control. Three packages are currently planned for introduction into Abrams Tank production. The FY85 package (Block #1) consists of a Hybrid NBC (over-pressure) system, upgraded armor, weight reduction, and a supension/final drive upgrade. Block #2 concentrates on an Improved Commander's Weapon Station with new independent Commander's and Driver's Thermal Viewers, Heading Reference System, Improved Rangefinder, Low-Profile Antenna and SINCGARS Intercom. Block #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 MI's survivability, fightability, and overall combat effectiveness on the hattlefield. The FY87 block for the IFV/CFV includes a Chemical/Biological Protective System. The IFV/CFV CB protective system will provide the crew with a total hybrid collective protection system. This system requires developing seals to maintain positive vehicle overpressure, providing a crew cooling system, incorporating decontaminant resistant materials, developing an air filter unit, and modifying vehicle stowage. The IFV/CFV CB protection system will be introduced into production vehicles in FY 1987. These packages will significantly enhance the IFV/CFV's survivability, fightability, and overall combat effectiveness on the battlefield. Blocks beyond FY87 will be responsive to threat and technology developments. Retrofit of PIPs to vehicles in the field will also be controlled in Blocks to continue cost control and minimize Integrated Logistics Support (ILS) problems. The M60 series tank has completed its planned product improvement program, and except for the M60 training devices. These are the Unit Conduct-of-Fire Trainers (UCOFT) for the M60Al and M60Al, a movable classroom simulator used at battalion/squadron level to provide training in critical tasks performed by M60 gunners and tank commanders, and the One-Station Unit Trainer (OSUT) for M60A3, a five-station gunnery simulator for training crewmen in basic and advanced gunnery skills at service schools.

G. (U) RELATED ACTIVITIES: Related, but nonduplicatory, Army activities being conducted are: PE 6.46.20.A-DC20, M1 Tank System; PE 6.46.16.A, Fighting Vehicle Systems (FVS); PE 6.46.30.A, M1E1 Development Program; 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 Material; PE 6.36.31-D014, Combat Vehicle Turret and Chassis.

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Program Element: #2.37.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Combat Vehicle Improvement Program
Budget Activitiy: #4 - Tactical Programs

H. (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; US Army Electronice Research and Development Command; Night Vision and Electro-Optics Laboratory, Fort Belvoir, VA; Chemical Systems Laboratory, Aberdeen Proving Ground, MD; Army Materials and Mechanics Research Center, Watertown, MA; Natick Laboratories, Natick, MA; 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, Muskegan, MI; Texas Instruments, Dallas, TX; Minneapolis Honeywell, St. Petersburg, FL; and FMC Corporation, San Jose, CA.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Development work on M60 adaptation hardware, automatic fire extinguisher, and training devices continued. Initiated RDTE for high-priority M1 PIP's.
- a. (U) Nuclear, Biological, and Chemical (NBC) Improvements: Initiated contract in FY81 for development of inertial dust seperator, installation of a chemical agent detector and alarm unit, and improved me erials resistant to decontaminating agents. Initial hardware ordered for subsequent trial installation. User added requirement for crew cooling to reduce heat stress degradation of performance.
- b. (U) Auxiliary Fower Unit (APU): Provides for on-board electrical power source other than the main engine. This enhances the tank's silvet watch capability and reduces fuel consumption by approximately 1000 gallons per year in peacetime. APD would also air in engine starting at -65.F. One unit tested on an Mi at Arctic Test Center. DUE TO CHANGE IN MISSION REQUIREMENTS, THE A.U WAS DELETED FROM THE IMPROVEMENT BLOCK.
- c. (U) Ballistic Armor Improvements: Provides for upgraded protection to meet anticipated 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-tisk components.

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Program Element: #2.37.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Programs

- 2. (U) FY 1982 Program: Conduct testing of trainers and initiate development of priority M1 and IFV/CFV product improvements.
 - a. (U) Initiate MI system integration engineering efforts for the following improvements funded in FY81.
- (1) (U) Hybrid NBC System with Crew Cooling: Begin testing of Hybrid NBC unit with crew cooling integrated. Develop engineering plans to integrate system into Ml tank.
- (2) (U) Ballistic Armor Improvements: Continue armor improvements for MIEl necessary to maintain parity with Soviet tank devices.
- (3) (U) Weight Reduction: Continue engineering efforts. Consummate special purchase of reduced-weight armor and fabricate a ballistic hull and turret from reduced-weight armor to determine total reduction and any deviation of armor performance from production line hulls and turrets.
- (4) (U) Suspension/Final Drive Upgrade: The goal of this improvement is to maintain RAM-D performance levels under the added weight of improved armor, the 120mm gun, and future improvements. The improvement currently consists of larger diameter, reindexed front torsion bars, and a change in final drive gearing.
- b. (U) Initiate RDTE program for IFV/CFV new start product improvement: Improved Chemical/Biological protection; requirement is to provide a total hybrid collective protection system.
- 3. (U) FY 1983 Planned Program: Complete development of Block 1 (Hybrid NBC system, ballistic armor improvement, weight reduction, and suspension/final drive upgrade) and construction of prototype MlEl tanks. Initiate development of Block 2 improvements. IFV/CFV effort will continue development of the FY82 Chemical/Biological product improvement and fabrication of test components.
- 4. (U) FY 1984 Planned Program: Complete development and integration of Block 1 improvements with initial production delivery of the MIE1 in 4085. Continue developmental work on Block 2 improvements: Conduct DT I for the MI 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

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Program Element: #2.37.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Combat Vehicle Improvement Program

Budget Activity: #4 - Tactical Programs

Reference Sensor. Complete DT/OT II of MIE1. Continue development and testing of the IFV/CFV CB collective protection system.

5. (U) Program to Completion: Introduce Block 1 into MIE1 production. IFV/CFV improvements will continue with evaluation of CB components both separately and integrated into the vehicle. Upon successful test results, these components will be incorporated into FY87 production vehicles.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #b330

Program Element: #2 17.35.A

DOD Mission Area: 7211 - Direct Fire Combat

Title: MIEL Block Improvement Program

Title: Combat Vehicle Improvement Program Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKCROUND AND DESCRIPTION: The rapid modernization of Soviet armor forces, which shows no signs of slowing, has virtually eliminated the United States (US) qualitative edge and has reduced the US capability to counter the acknowledged Warsaw Pact numerical advantage in these systems. Essential to reversing this trend is fielding the superior MI tank and introduction of subsequent MI performance improvements for the 1980's and beyond to maintain this superiority. The MI, 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 incorporates significant advances in crew protection, firepower, and mobility, the MI was designed with growth potential in mind and can be adapted by evolutionary improvements to sustain its combat advantage and reduce its logistic burden. The MI Block Improvement Program (BIF) provides for timely initiation of planned MI performance improvements to be responsive to threat changes and to capitalize on technological opportunities. The BIP will introduce time-phased product improvements to the production line in groups called "blocks" to minimize production costs while providing effective configuration control. Three packages are currently planned for introduction into production. The FYES package (Block #1) consists of a Hybrid NBC (overpressure) system, upgraded armor, weight reduction, and suspension/final drive upgrade. The FY87 package (Block #2) concentrates on an improved Commander's Weapon Station with new independent Commander's and Driver's Thermal Viewers, Heading Reference System, Improved Rangefinder, Low-Profile Antenna and SINCGARS Intercom. Block #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 MI's survivability, fightability, and overall combat effectiveness on the battlefield. Petrolit of improvements to vehicles in the field will also be controlled in packages to once again control cost and minimize integrated Logistics Support (ILS) prob-

B. (U) RELATED ACTIVITIES: The Tank Automotive Command (TACOM) Fank 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 MI, the MI Program Manager Integrates them into the MI tank. An HI PIP Steering Committee, chaired by the MI 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 (PF) 6.46.20.A, MI Tank System; PE 6.46.30.A, MIEI Development Program; 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.

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Project: #D330

Program Element: #2.37.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: MEL Block Improvement Program

Title: Combat Vehicle Improvement Program
Budget Activity: 44 - Tactical Program

- C. (U) WORK PERFORMED BY: In-house efforts are accomplished by the Program Manager for MI, Warren, Michigan. The major contractor is Chrysler Defense Engineering, Conterline, Michigan.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURED EXCERNAS:
 - 1. (U) FY 1981 and Prior Accomplishment; Program;
- a. (U) Nuclear, Biological and Chemical (NBC) Improvements Program: Initiated contract in FY81 for development of Inertial Dust Se arator, installation of Chemical Agent Alarm, and Improved Materials Resistant to Decontaminating Agents. Initial hardware ordered for subsequent FY82 trial installation. User evaluation developed requirement for crewman cooling to reduce offects of heat stress.
- 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 MI at Arctic Test Center, five units delivered for FY82 vehicle testing. Subsequent evaluation of the need for the APU by the Armor Center resulted in elimination of the need for the APU as the Silent Watch Capability requirement was eliminated.
- 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 Hybrid NBC System, improved armor, and the 120mm gun. Minimum weight reduction goal is .75 tons and will be achieved through changes to the production process and redesign of selected low-risk components.
- e. (U) Suspension and Final Drive Upgrade: These improvements are necessary to maintain RAM-D and maneuverability performance under the increased weight of the improved armor and the 120mm gun.
- 2. (U) FY 1982 Program: Initiate M1 systems integration engineering efforts for improvement capabilities funded in FY81, and fund fabrication and installation of improvements on prototype MIE1 Tanks. Begin planning effort for Block 2 improvements.

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Project: #D330 Program Element: #2.37.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: MIE1 Block Improvement Program
Title: Combat Vehicle Improvement Program
Budget Activity: #4 - Tactical Program

- a. (II) Nuclear, Biological and Chemical (NBC) Improvements: Begin testing of inertial dust separator, chemical agent alarm, and hybrid system/crew cooling. Institute development of decontaminant-resistant materials. Develop enginearing design changes to integrate NBC systems into ARMOR envelope of vehicle.
- b. (U) Ballistic Armor Improvements Program: Continue armor improvement for 120mm MIEL necessary to maintain parity with Soviet tank advances.
 - c. (U) Weight Reduction: Continue weight reduction efforts.
 - d. (U) Suspension: Continue improvements identified in the FY82 program.
- 3. (U) FY 1983 Planned Program: Continue system integration of Block 1 Improvements into MIEL. Initiate development of Block 2 including:
- a. (U) Commander's Weapon Station and Thermal Viewer: Provide greater visibility enhancing command and control under "dirty battlefield conditions." Initiate contract for Collivery of hardware for FY83 testing.
- b. (U) Driver's Thermal Viewer: Provide for greater visibility and target acquisition on the "dirty battlefield" and/or during night operations. Conduct installation check test using advanced development prototype provided by the Night Vision and Electro-Optical Laboratory.
- c. (U) Heading Reference System: Begin integration of a Heading Reference Unit (HRU) to assist crew in navigation at night or under reduced visibility conditions.
- d. (U) Improved Rangefinder, Low Profile Antenna, and SINCGARS Intercom: Begin RDTE for an Improved Rangefinder, survivable Low Profile Antenna, and SINCGARS Intercom.
- FY 1984 Planned Program: Complete development and integration of Block I improvements with int fal productive delivery of the MiEl in 4QFY85. Continue developmental work on Block 2 improvements: Conduct DT I for the .: Driver's Thermal Viewer. Continue integration of a Survivable Low Profile Antenna and Speech Secure Radio System. Begin developing Signature Suppression System, improved hit capability against evasive targets, and an Automatic Muzzle Reference Sensor.

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Project: #D330 Program Element: #2.37.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: MIEL Block Improvement Program
Title: Combat Vehicle Improvement Program
Budget Activity: 4 - Tactical Program

5. (U) Program to Completion: Integration and testing of the aforementioned product improvements will be completed with Nuclear, Biological and Chemical (NBC) Protection Improvements, upgraded armor, weight reduction, and suspension-final drive upgrade entering production in 4QFY85. Other improvements will enter production in Block #2 (FY88) and Block #3 (TBD).

6. (U) Major Milestones:

Package #3

Milestone Dates Current Shown in FY 1982 Submission Major Milestones Milestone Dates Introduce into Production -4QFY85 Package #1 4QFY85 Package #2 FY88 (tentative) 4QFY87 (tentative)

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Project: #D330
Program Element: #2.37.35.A
DOD Mission Area: #211 - Direct Fire Combat

Title: MiFl Block Improvement Program

Title: Combat Vehicle Improvement Program

Budget Activity: #4 - Tactical Program

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

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	otal Estimated Cost
Funds (current requirements)	16022	25168	42364	42048	Continuing	Not Applicable
Funds (as shown in FY 1982	16022	25246	15189	Not Shown	Continuing	Not Applicable
submission)						

The FY82 decrease results from pricing and inflation adjustments. The FY83 increase results from the final definition of the Block Improvement program in March 1981 and the Army approval of the composition of Block I in September 1981.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.39.A

DOD Mission Area: #222 - Ground-Based Antiair and

Tactical Missile Defense

Title: AN/TSO-73 Modifications

Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PPOCRAM ELEMENT QUANTITIES	FY 1981 Actual 1330 3	FY 1982 Estimate 532	FY 1983 Estimate 1025	FY 1984 Estimate	Additional to Completion 0	Total Estimated Cost 2887
D233	AN/TSQ073 Modifications	1330	532	1025	0	0	2887

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: As initially contracted in 1970, the AN/TSO-73 (Missile Minder) system had 40,000 words of memory, 8,000 of which were spare, and a growth capability to 64,000 words of memory. As the system has matured and subsequent requirements developed, all 64,000 words of memory have been installed and used, and all cost-effective memory saver software modifications have been made to allow software to operate at maximum efficiency, but no additional capacity remains to correct current operational deficiencies. The group-configured AN/TSO-73 must be able to interface with a subordinate PATRIOT Missile battalion to properly control and distribute air defense fires. The battalion-configured AN/TSO-73 must be able to interface with evolving HAWK improvements and 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 German Air Defense Ground Environment (GEADGE), and Short Range Air Defense Command and Control (SHORAD C2). The proposed Complementary Metal Oxide Silicon (C-MOS) Memory Expansion will increase the memory from 64,000 to 96,000 words with a capability of expanding to 256,000 words. The new memory hardware will also avoid physical obsolescence of the memory and will increase reliability, availability, anaintainability, and decrease long-term logistical support by eliminating 16 power supplies and 10 core stacks per system, in addition to 541 circuit boards.

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Program Element: #2.37.39.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: AN/TSO-73 Modifications
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1983 RDTE REQUEST: The FY 1983 budget request for the C-EOS Memory Expansion program provides for completion of testing and evaluation and upgrade of system software.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	1330	532	1025	0	2887
Funds (as shown in FY 1982 submission)	1330	532	0	0	1662

Changes in FY83 represent a need for more lead item purchases for CMOS kits.

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement						
Funds (current requirements)	-	0	0	8300		8300
Funds (as shown in FY 1982						
submission)	-	3100	1800	0	-	4900
Quantities (current requirements) Quantities (as shown in FY 1982				16		16
submission)			9	7		16

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Program Element: #2.37.39.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense Title: AN/TSO-73 Modifications

Budget Activity: #4 - Tactical Programs

F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: As a result of new requirements, increased sophistication, and new interface demands, the AN/TSO-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. The Missile Minder (AN/TOS-73) is at the crossroads where memory must be made available to satisfy current demands either by reducing Materiel 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 541 circuit board cards.

- G. (I) RELATED ACTIVITIES: Program Element 6.47.79.A, Joint Interoperability Tactical Command and Control Systems (JINTACCS) Arry). The JINTACCS program will provide data related to overall improvement in tactical effectiveness of US Armed. es 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 line 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 1981 and Prior Accomplishments: Initiated C-MOS Memory Expansion Program. Purchased long-lead items for systems to be used for test and evaluation.
- 2. (U) FY 1982 Program: Award contract for fabrication and installation of modifications to test and evaluation systems and for software modifications.

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Program Element: #2.37.39.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: AN/TSO-73 Modifications
Budget Activity: #4 - Tactical Programs

- 3. (U) FY 1983 Planned Program: Funds requested will be used to complete the development effort including test and evaluation. Maintenance and diagnostic programs and software modification, integration, and certification will also be completed. Nine (9) kits are planned for procurement.
 - 4. (U) FY 1984 Planned Program: Initiate modification kit production to completion.
- 5. (U) Program to Completion: Kit application is scheduled to begin in fourth quarter FY85 and to be completed during the fourth quarter FY86.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.40.A DOD Mission Area: #351 - Land Warfare Title: Maneuver Control System
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 7877	FY 1982 Estimate 14825	FY 1983 Estimate 14947	FY 1984 Estimate 9858	Additional To Completion Continuing	Total Estimated Costs Not Applicable Not Applicable
D484	Maneuver Control System	7877	14825	14947	9858	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program consists of development of a tactical command and control system which provides automated assistance to process combat information for battle staffs. It provides assistance in the collection, storage, distribution, review, and display of information. Both text and map graphics are available to the user. This system allows operations staffs, G3/S3, to prepare, process, and distribute estimates, plans, orders, and reports. It is designed to operate with existing and planned tactical communications. Interoperability with the Army's four other functional control systems (fire support, intelligence/EW, air defense and combat service support) will provide total force level information to the commander. The Maneuver Contro System (MCS) fulfills an urgent need for command and control of battlefield operations from echelons of corps through battalion. It is needed to provide the commander the improved command and control he needs to fight more effectively on the modern battlefield, where he is likely to be outgunned and outnumbered; this is achieved by providing accurate, up-to-date information, thereby permitting quicker decisions allowing more rapid application of fire and maneuver. The key feature of this program is its Evolutionary Development and implementation beginning with an FY 1981 initial maneuver control capability in Europe and expanding in preplanned, time-phased steps to a full Maneuver Control System (MCS) 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 a commander. MCS uses existing equipment in engineering development to meet the immediate need with provision to evolve to satisfy the complete maneuver control requirement and apply current state-of-the-art technology. The Army has the baseline set of requirements which defines that information required by a maneuver commander and is the basis on which MCS can be evolved. Requirements are continuing to be validated as a result of feedback from the European prototype. The initial validation was completed in the fourth quarter of FY 1981 with evaluation of system performance during Reforger 81. MCS major components consist of the Tactical Computer System (TCS), AN/UYK-19 (V), and the Tactical Computer Terminal (TCT), AN/UYO-30.

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Program Element: #7,37.40.A DOD Mission Area: #351 - Land Warfare

Title: Maneuver Control System
Budget Activity: #1 - Tactical Programs

C. (U) BASIS FOR FY 1983 RDTE REQUEST: Emphasis in FY 1983 continues to be evided ion of the initial Maneuver Control capability with preplanned, time-phased improvements. Feedback from this effort is being used to implement, test, and evaluate new functional Maneuver Control capabilities. Improvements to user applications will include initial data base capabilities, additional protocols, summary reports, and security management. European prototype configuration will be completed with final delivery of additional Tactical Computer Systems. The design plan for a longer term evolutionary development effort will be initiated. Upon successful completion of Milestone III, contract awards will be made for procurement of initial Maneuver Control Systems and continued evolutionary development to enable progression from initial capabilities to a mature system. The program provides for infusion of new technology, as necessary, to preclude obsolescence and respond to user feedback to insure the most responsive applications are available.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Mission Element Need Statement (MENS)	1081	1081
Approved Contract Award for		
System Design	4082	3082
ASARC III, Maneuver Control	2083	Not Shown
Contractual Implementation for subsequent Evolutionary Development and prototype		
support	4083	N/A

Afternative evolutionary development concepts for the long-term, full-system capability were deferred until FY82 per congressional guidance to evolve the ultimate battlefield automated system design based on leedback from the field and to not solicit industry until the system requirements were better defined. ASARC III, not shown last year, replaces the previously identified ASARC I; the Army has elected to pursue DOD evolutionary development concepts to compress acquisition time of necessary automated command and control capabilities.

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Program Element: #2.37.40.A

DOD Mission Area: #351 - Land Warfare

Title: Manager Control System
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REOULET: (\$ in thousands)

				Additional	Total Estimated
RDTE	FY 1981	FY 1982	FY 1983	to Completion	Cost
Funds (current requirements)	7877	148.5	14947	Continuing	Not Applicable
Funds (as shown in FY 1982	7877	14869	44515	Continuing	Not Applicable

The FY 1983 difference is due to a reduction resulting from retined estimates of anticipated costs during this period, the Army decision to maintain only one Maneuver Control prototype rather than two (e.g., Europe rather than both CONUS and Europe), and general reprograming to higher Army requirements. The FY 1982 difference is due to an inflation adjustment.

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion 2/	Total Estimated Cost 2/
Other Procurement, Army: 1/ Funds (current requirements)	N/A	N/A	26,100	17,400	414,500	455,700
Quantities (current requirements)						
Tactical Computer System	N/A	N/A	10	6	144	
Analyst Console	N/A	N/A	3	3	40	
Tactical Computer Terminal	N/A	N/A	21	9	436	

1/ The funds are for ADP hardware devices including production engineering for deploying the Maneuver Control System (MCS) beginning in FY85. FY83 and FY84 procurements field the MCS to the VII Corps and will complement retrofitted devices previously introduced.

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Program Element: #2.37.40.A DOD Mission Area: #351 - Land Warfare Title: Maneuver Control System
Budget Activity: #4 ~ Tactical Programs

2/ These quantities are for active Army only; insofar as this program is an evolutionary development, it is expected that feedback from Europe will alter configuration quantities as needs become more clear resulting from the continuing use and evaluation of MCS; in like manner, funding estimates will change.

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Program Element: #2.37.40.A

DOD Mission Area: #351 - Land Warfare

Title: Maneuver Control System

Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Maneuver Control System (MCS) 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 several 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. Thus an urgent need exists for automated means to assist combat commanders. It is using existing equipment concluding development begun in FY75, the Tactical Computer System (TCS) and the Tactical Computer Terminal (TCT), which are proceeding to type classification. An initial Maneuver Control capability has been established in Europe in the VII Corps. and this initial configuration will undergo a continuing evolutionary development. There will be a logical, event-oriented. time-phased progression of incrementally developing, testing, evaluating, and fielding of functional capabilities leading to the full Maneuver Control System. The advantage of doing this in a live user environment is that it provides the user with an intial Maneuver Control capability now and permits the user to test alternative contigurations 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 1983 is required to further evolve Maneuver Control functions and to develop the evolutionary development design plan for the Hall Maneuver Control System (MCS). The final design plan will be based upon the baseline set of requirements and will provide the engineering direction for the objective MCS. Contractual efforts in FY 1983 and beyond will be required to maintain the European prototype and respond to user feedback with evolving improvements based on requirements validated by the operational user.

G. (U) RELATED ACTIVITIES: Program Element 6.47.27.A: Tactical Computer System/Tactical Computer Terminal (TCS/TCT). This project provides the generic hardware for the mineuver control element and does not duplicate any efforts conducted in MCS; Program Element 6.47.12.A: System Engineering for Tactical C3 Systems. This program provides resources for implementation of force interoperability functions.

H. (U) WORK PERFORMED BY: Project Manager, Operations Tactical Data Systems (OPTADS), US Army Communications Research and Development Command (CORADCOM), Ft Mormouth, NJ. A contractor will be competitively selected for the full MCS evolutionary development effort.

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Program Element: #2.37.40.A DOD Mission Area: #351 - Land Warfare Title: Maneuver Control System
Budget Activity: #4 - Tactical Programs

1. (U) PROGRAM ACCOMPLICHMENTS AND FUTURE PROGRAMS:

- 1. (II) FY 1981 and Prior Accomplishment: Modern, militarized computer hardware, specifically, three Tactical Computer Systems (TCS) and seventeen Tactical Computer Terminals (TCT), were introduced into Europe VII Corps as the initial Maneuver Control elements from which evolution has proceeded. Operational evolution of the prototype Maneuver Control System was continued in Europe during Reforger 81 training exercise. The baseline communications software was introduced as well as the communications interface, report/order generation, and automated assistance software. A memorandum of understanding between USAREUR, the combat developer and material developer was executed. Establishment of a European Field Office was initiated.
- 2. (U) FY 1982 Program: Evolution of the Maneuver Control prototype in Europe continues with time-phased, preplanned improvements to expand the base from which field experience is being obtained. Mass storage media are being introduced to begin data base implementation. Additional Tactical Computer Systems (TCS) and Tactical Computer Terminals (TCT) will be added to the prototype. A contract to complete the full MCS design plan and to continue evolutionary development of the full MCS will be awarded.
- 3. (U) 14 1983 Planned Program: During this period, the program continues the incremental development, testing, evaluation and fielding in Europe of added user functions. Implementation cycle will be geared to the needs of the user and the capability of units to absorb in a logical fashion expanded functional elements of both hardware and software. Pending a successful Milestone III review, procurement of system components will begin, and contractual implementation of subsequent evolutionary development for the full MCS will start.
- 4. (U) FY 1984 Planned Program: In FY 1984, software development will focus on the full data base implementation while beginning integration of those force-level interoperability functions specified in the Army's Battlefield Interface Concept (ABIC). Contractor effort will continue prototype maintenance and support.
- 5. (U) Program to Completion: Full Maneuver Control System (MCS) evolutionary development continues under contract and in Europe under the evolutionary fielding approach both in hardware and software. The government Software Development and Support Center will continue to support the prototype system. User applications for the full MCS, especially force-level information protocols, continue with field integration commencing within the Command, Control and Subordinate Systems (CCS2) environment.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.37.42.A

DOD Mission Area: #345 - Tactical Communications

Title: Communication Systems Engineering Program

Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
0.70	TOTAL FOR PROCRAM ELEMENT	0	0	1485	1869	Continuing	Continuing
372	Communication System Engineering Program	0	0	1485	1869	Continuing	Continuing

- B. (U) BRIEF DESCRIPTION OF EIEMENT AND MISSION NEED: The Communications Systems Engineering Program is an attempt to unify the fragmented management for development and improvement of tactical communications systems into a single program in order to resolve problems in an effective and timely way. It provides near-term user assistance through military adoption of commercial items and accelerated product improvement using existing technology. This activity, along with development of new procedures, will provide a sound management base to address current user requirements and problems.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Program will initiate excursions into airborne retransmission shelter, investigation of an en route communication capability for use with hirborne and ground forces, initiate development of an automated Communications Electronics Operating Instructions (CEOI) device and a burst data device for field use.

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Program Element: #2.37.42.A
DOD Mission Area: #345 - Tactical Communications

Title: Communication Systems Engineering Program
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
First (current requirements)	. 0	o	1485	Continuing	Continuing
Funds (as shown in FY 1982 submission)	0	0	0	0	0

This is a new submission in FY 1983.

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

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Program Element: #2.37.42.A

DOD Mission Area: #345 - Tactical Communications

Title: Communication Systems Engineering Program

Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: There is an urgent need to take positive action to upgrade the current tactical communications posture throughout the Army. While there are numerous developmental actions underway to enhance various aspects of the communications systems, these actions need to be unified into a single program. The Communications Systems Engineering Program is an effort to unify the fragmented management for development and improvement of tactical communications systems into a single program having the responsibility and authority for resolving near-term problems in an effective and timely way. The objective is to provide near-term assistance in the form of quick-reaction projects through military adoption of commercial items, product improvements, accelerated development based on technology and development of new procedures. This program will provide a basis for action on user problems and reuirements and will be a means for modification of performance specifications for those systems presently under development.
- G. (U) RELATED ACTIVITIES: None.
- H. (U) WORK PERFORMED BY: Program Management will be performed by the Director for Center for Systems Engineering and Integration. This effort is supported by representatives from the Communications-Electronics Command (CECOM) and the US Army Signal Center.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 1981 and Prior Accomplishments: Not Applicable.
 - 2. (U) FY 1982 Program: Not Applicable.
- 3. (U) FY 1983 Planned Program: Initiate development of an automated CEOI device and development of burst data device for field use. Begin excursions into airborne retransmission shelter, investigation of en route communications capability for use with airborne and ground forces. Proceed with development of an automatic tactical frequency engineering pilot system.
- 4. (U) FY 1984 Planned Program: Initiate efforts to improve HF capabilities to handle Emergency Action Messages (EAM) for Nuclear Capable Forces and to improve multichannel capability. Provide system engineering for effective fielding of emergency automatic data processing systems. Investigate the need and supportability of millimeter wave radios for tactical operations.

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Program Element: #2.37.42.A

DOD Mission Area: #345 - Tactical Communications

Title: Communication Systems Engineering Program
Budget Activity: #4 - Tactical Programs

5. (U) Program to Completion: Continue developments to provide solutions to communications problems including maintenance and repair. Continue to be aware of technology investigations of industry initiatives and evaluate their application to military communications systems. This is a continuing program.

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FY 1983 RDTE CONCRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 35084	FY 1982 Estimate 42986	FY 1983 Estimate 47184	FY 1984 Estimate 52515	Additional to Completion Continuing	Total Estimated Cost Not Applicable
D104	Joint Tactical Communica- tions (TRI-TAC) Office	6.349	7022	7333	7320	Continuing	Not Applicable
D107	Mod to Army TRI-TAC Interface	0	5057	5068	4820	Continuing	Not Applicable
D1 10	Mobile Subscriber Equipment	113	8033	2149	2003	Continuing	Not Applicable
D111	Digital Group Multiplexer	2851	1445	5296	2340	Continuing	Not Applicable
D114	Other Service						
	Assigned TRI-TAC Tasks	2305	1992	4568	4944	Continuing	Not Applicable
D116	Facility Support Element	851	1049	981	953	Continuing	Not Applicable
D1 17	Short Range Wideband Radio						
	(SRWBR) Assemblages	622	267	274	0	0	7663
D1 19	Modular Record Traffic						
	Terminal (MRTT)	6313	6863	9791	24239	Continuing	Not Applicable
D172	Net Radio Interface (NR1)	427	267	139	204	Continuing	Not Applicable
D178	Joint Test Support	1363	1737	1945	1194	Continuing	Not Applicable
D222	Automatic Communications					• • • • • • • • • • • • • • • • • • • •	• •
	Central Office AN/TTC-39	13390	9254	9641	4498	0	262496

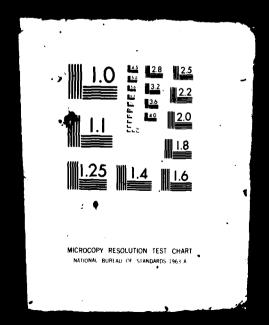
^{* (}Mantities include 9 AN/TTC-39 Circuit switches, 7 AN/TYC-39 Message Switches, total of 549 items of DGM family (15 components), 6 AN/CRC-1/1 Radio Set SRWBR Modification Kits, and 3 each prototype assemblages of AN/TRC-173 Radio Terminal, AN/TRC-174 Radio Repeater, Standard SRWBR Assemblage, Radio Terminal Set, AN/TRC-175, and the Modified AN/TRC-138 Radio Repeater. Other RDTE quantities represent a number of diverse items.

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Program Element: #2.80.10.A DOD Mission Area: #345 - Tactical Communications Title: Joint Tactical Communications (TRI-TAC) Program
Pudget Activity: A. Tactical Programs

B. (U) BRILE DESCRIPTION OF ELEMENT AND MISSION OF DE Joint Sactional Communications (TRI-TAC) Program is a Joint Service and both Agency program to develop and theid twiter tactical sufficiently seitched communications systems and equipment to satisfy the tactical communications needs of the military tryices by a hiering interoperability between Army and other Department of Defense (DOD) telecommunications systems, we take new equipment which reflects the most recent technology, and eliminating duplication among the service/agency to teach. These systems/equipment will provide combat forces with tactical communications equipment to meet the mobility, a money, reliability, and availability requirements of the modern battlefield, provide resistance to the intercept and electronic warrare threat of potential enemies, and reduce life cycle support and personnel costs. The current inventory of Area Could could ichannel switched communications systems and equipment is characterized by obsolete, manpower-lutensive, predeminantly manual telephone and record traffic (messages) switchboards; obsolete, low-speed, electromechanical, unreliab and etypewriters, nonsecure analog telephones, and a digital, solid-state multichannel transmission system capable only at link security and manual technical control/management facilities. Current tactical voice telephone systems are not apable 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-TAG program will provide a significant increase in capability over current systems/equipment. The Army's Integrated Tactical Communications bystem (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 hobile Subscriber Access system that provides the addressability of an automatic telephone system and the mobility and voice security of a net radio. Both voice and record traffic switching functions will be secure, automated, and processor controlled, and telephone subscribers will have the capability of end-to-end security.

C. (U) BASIS FOR FY 1983 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

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Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

preparation for award of development contract for Mobile Subscriber Equipment (MSE). MSE is the secure, mobile, radio-telephone to replace the limited mobility, nonsecure multichannel system currently used at brigade and in the division area. Continue support of Digital Group Multplexers, Short-Range Wideband Radio Assemblages, AN/TIC-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.

Malor Milyatana	Current	Milestone Dates
Major Milestones (Message and Circuit Switch)	Milestone Dates	Shown in FY 1982 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 S Evaluation (DTE-10TE)		
Start Message Switch/Circuit Switch	Jul 78/Feb 79	Jun 78/Feb 79
Complete Message Switch/Circuit Switch	May 79/May 80	Jun 79/Apr 80
Defense Systems Acquisition Review Council (DSARC III)		
AN/TYC-39 Message Switch	Mar 80	Mar 80
AN/TTC-39 Circuit Switch	Jul 80	Jul 80

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Program Element: #2.80.10.A DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Frogram Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Production Contract TTC-39/ TYC 39 Switches Init.al Operational Capability (IOC)	Sep 80	Sep 80
AN/TYC-39 Message Switch AN/TTC-39 Circuit Switch	Mar 83 Aug 83	Feb 83 No Submission

- 1. (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 1982 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1981	FY 1982	FY 1983	FY 1984	Additional To Completion	To al Est mated Cost
Funds (current requirements)	35084	42986	47184	52515	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	33485	48107	71738	65093	Continuing	Not * plicable

General: The changes in the program are based on changes in the inflation index, a \$5.0 million Congression - FY82, and a restructuring of the program based on changing requirements.

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Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army						
Funds (current requirements)	97800	111000	288100	277100	Continuing	Not Applicable
Funds (as shown in FY 1982						
submission)	89400	102400	232200	~	Continuing	Not Applicable
Ouantities (current requirements) Ouantities (as shown in FY 1982	*	*	*	*	*	*
submission)	*	*	*	*	*	*

* Large number of diversified items.

General: The increases in the program are based on an increase in the inflation index, increases due to FY81 supplemental and F782 amended budget, and a restructuring of the program based on increased requirements.

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 \$72,300 thousand, and the third year (FY82) cost is \$82,100 thousand; these costs include changes from the FY81 submission caused by FY81 supplemental and FY82 amended budget.

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Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Program Surject Activity: See Factical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: TRI-TAC has been entitished as a Joint Army, Navy, Marine Corps, Air Force, and National Security Agency (NSA) program to: (i) assure communications to 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 tranking and switching to support US combat forces communicing in the early 1980's. It will interconnect with the Detense 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 Mormouth, NJ, and the Army share of the Joint Test Element (JTE), Fort Buac, ca, 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) REIATED ACTIVITIES: Related programs include other Services- and National Security Agency (NSA)-assigned TRI-TAC tasks under program element 2.80.10.F, 2.80.10.M, and 3.34.01.G (Communications Security Equipment). The TRI-TAC Utice monitors all of the assigned TRI-TAC programs and any Service/DOD agency-related programs to insure there is no duplication of effort.

II. (U) WORK PERFORMED BY: Overall System architecture and interservice coordination is performed by the Joint Tactical Communications Office (TRI-TAC), Fort Mormouth, NJ. 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); Singer/Librascope, Glendale, CA (SST); and ITT, Nutley, NJ, (SRWBR). The TRI-TAC Office, which is totally funded by the Army, has one support contractor, Planning Resources Corporation, Mclean, VA. In-house developing organization for TRI-TAC tasks assigned to the Army is the US Army Communications-Electronics Command, Fort Mormouth, NJ (Project Manager, Multi-Service Communications Systems (MSCS)).

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Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Two competitive advanced development contracts were awarded for the AN/TTC-39 family of circuit and message switches in 1972. 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 Special DSARC Review was held in November 1976 on the AN/TTC-39 family of switches as a result of a breach ot Development Concept Paper #135 cost and schedule thresholds. As a result, a revised program baseline was established, which extended the circui, switch schedule by 16 months and the message switch schedule by 9 months. The AN/TTC-39 contractor was directed to constraid development effort through FY 1977 under a cumulative funding cap of \$100.5 million. DCM models to support the Air Force Technical Communications Control Facilities (TCCF) program were delivered in August 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/TYC-39 Message Switch was completed. Test models were delivered to the Joint Test Facility and Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/IOTE) on the AN/TYG-39 Message Switch was started. 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 establishment of the Facility Support Element to provide the baseline of inventory equipment necessary to support the testing of all TRI-TAC equipment as required by DOD Instruction 5148.8, 13 June 1980, was completed. Engineering development contract for Short-Range Wideband Radio (SRWBR) modification to the AN/GRC-144 Radio Set was awarded. In FY 1979 DTE/10TE of the AN/TYC-39 message switch was completed. DTE/fOTE began on the AN/TTC-39 circuit switch, DCM equipment and the AN/TRC-173 and 174 DCM assemblages. 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, the following actions were taken: awarded a three-year multiyear contract for AN/TTC-39 and AN/TYC-39 switches on 30 Sep 80 following tavorable 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 DSANC 1 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 and Operational Test and Evaluation of the DGM equipment and the AN/TRC-173 and AH/TRC-174 assemblages and prepared for initial production award, to include AB/TRC-175.

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Program Element: #2.80.10.A

POD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: F4 - Tactical Programs

- 2. (U) FY 1982 Program: Begin fielding the Basic Net Radio Interface Device and prepare for Modular Tactical Communications Center (NTCC) Army System Acquisition Review Council (ASARC). 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.
- 3. (U) FY 1983 Planned Program: Begin fielding of both the AN/TYC-39 Message Switch and the AN/TTC-439 Circuit Switch; complete DTE/IOTE of SST; conduct In-Process Review and award initial production contract. 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 trems. Continue funding support of TRI-TAC Office and Joint Test Element.
- 4. (U) FY 1984 Planned Program: Begin fielding of Digital Group Multiplexer equipment and assemblages and Short Range Wideband Radio assemblages. Continue software interface development for maintaining interoperational system compatability of oftware 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 TRITAC software system compatibility and other service-managed TRI-TAC items.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D104
Program Element: #2.80.10.A
DOD Mission Area: #345 - Tactical Communications

Title: Joint Lectical Communications (TRI-TAC) Office title: Joint lactical communications (TRI-TAC) Program Budget Activity: #4 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Joint Tactical Communication (TRI-TAG) 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, TR1-TAC Office, under the staff supervision of the ASD(C31) now DUSD(C31), and Project D104 was created to provide funding support to the TR1-TAC Office. The major thrusts of the TR1-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/Egency is tasked by the Secretary of Defense to acquire elements of the TRI-TAC program. The tar od Service/Agency funds the R&D effort for the tasked elements and procures those elements to satisfy all DOD requirements. The 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 DUSD(C31), and programed 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-T. A matters for MATO and other allied governments. He prepares equipment specifications, configuration control, maintains interrity 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 furtial Operational Test and Evaluation (DTE/IOTE) of IRI-IAC systems and equipment to include the establishment and overall changement of a Joint Test Element and a Joint Test Facility. The Director also coordinates the production planning of TRI-TAC systems and assists the DUSD(C31) 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 Modifications 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: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

Air Force (PE 2.80.10.F)

Technical Communications Control Facilities (TCCF)

Digital Tropospheric Scatter Radio Terminal (TROPO) AN/TRC-170V()

Digital Nonsecure Voice Terminals (DNVT), TA-954 & TA-984

Joint 1est Element (JTE) Support

Navy (PE 2.80.10.1)

Tactical Digital Facsimile (TDF) AN/UXC-4

Advanced harrowband Digital Voice Terminal (ANDVT)

Joint Test Element (JTL) Support

Marine Corps (PE 2.80.10.M)

Unit Level Switch (ULS) Family, AN/TTC-42V(), SB-3865, GYC-7

Joint Test Element (JTE) Support

NSA (FE 3.34.01.6 - Comm Security Equipment)

Communications Security (COMSEC)

Communications Security

(COMSEC)

Communications Security (COMSEC)

AMDVT - Communications Security (COMSEC)

Joint Test Element (JTE) Support

C. (U) WORK PERFORMED BY: TRI-TAC Office, Fort Monmouth, NJ. Supporting contractor effort is performed by Planning Resources Corporation, McLean, VA.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 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/11C-39), including specilications 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 TRISTAC Technical Control Facility (Air Force) and the Digital Group Multiplexer family (Army). In 1970, FSD contracts were awarded for the Digital Trophosheric 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 bob promulgated

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Project: #D104

Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

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 telephone circuits. In 1977 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. In 1978-1979, the TRI-TAC office participated in the selection process for contracts for the Digital Act Radio Interface, Digital Nonsecure Voice Terminal, and the Short-Range Wideband Radio Modifications to the AN/GRC-144 Radio Set. In 1'co, successful Detense Systems Acquisition Review Councils were held for the IRI-TAC switches, and a production contract (chrec-year multiyear) for AN/TYC-39/AN/TTC-39 switches was awarded by the Army. Competitive FSD contracts for the develope of the Digital Monsecure Voice Terminal were awarded by the Air Force. In FY61, testing efforts continued with the contletion of DTE/JOTE for the TDF and AN/TTC-39 programs respectively; and production decisions reviews for the bighest croup Multiplexer and Digital Tropospheric Scatter programs resulted in approval to enter production.

- 2. (U) FY 1982 Program: Monitor testing on the CBCF, Edv., SERRID and associated COMSEC equipment. Insure award of the FSD contract for the CSCE. Insure award of the initial production contracts on the DGM, TROPO (AN/TRC-170), DNVT, TDF, BNRID (C-6709), and AN/GRC-144 modifications programs. Farticipate in planning to field the AN/TYC-39 Message Switches and AN/TTC-39 Circuit Switches in FY83 and the Digital Group Multiplez equipment and assemblages and Short Range Wideband Radio assemblages in FY84.
- 3. (9) FY 1983 Planned Program: Monitor deliveries/fielding of Thirduct switches to operational units. Monitor DTE/IOTE of the ULCS and ANDVT programs. Insure award of Fab contract for the MICC program. Insure award of initial production contracts for the CNCE program and follow-on production contracts on the AN/170-39 (COMSEC). Monitor delivery of DRIVTS and fielding of the AN/TYC-39 and AN/TYC-39 switches. Participate in planning to field the Digital Group Multiplex equipment and assemblages and Short Range Wideband Radio assemblages in FY85.
- 4. (U) FY 1984 Planned Program: Monitor continuing delivery/fielding of TMI-TAC switches to operational units. Monitor initial deliveries of the IROPO, DCM, and AN/GRC-14 equipment. Monitor continuing testing of TRI-TAC equipment and COMSEC. Insure award of initial production contracts for the SST and the SDKRIU. Monitor fielding of the Digital Group Multiplexer equipment and assemblages and Short kange Wideband kadio assemblages.
 - 5. (B) Program to Completion: This is a continuing program.

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Project: #D104
Program Element: #2.50.10.A
DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Office
Title: Joint Lactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

6. (U) Major Milestones: Not Applicable.

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	6849	7022	7333	7 32 0	Continuing	Not Applicable
Funds (as shown in FY 1982 cubmission)	6849	7037	7313	-	Continuing	Not Applicable
Quantities (current requireme	ents)					*
Quantitles (as shown in FY 19 sutmission)	162					*

*No hardware or se' ware quantities are included in this project.

Funding Differences. The changes in the FY 1982 and 1983 funding estimates are based on application of inflation indices and requirements changes.

Validity of the Development Costs: Validity is excellent because required funds are for predictable civilian salaries, operating expenses, and support contracts.

Other Appropriations: Not Applicable.

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FY 1963 HOTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D107 Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Modifications to Army TRI-TAC Interface
Title: Joint Tactical Communication (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

- A. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: The Project represents a new requirement for hardware and software modifications to the AN/TC-39 Message Switch and the AE/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 affect 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-Electronics Command, Fort Mormouth, NJ.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 198 and Prior Accomplishments: Not Applicable. New program beginning in FY 1982.
- 2. (B) FY 1982 Program: Begin developing software to provide an alternate parent switch interface between the AN/TTC-39 family of switches and the AN/TTC-42 Poit 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 (CNCE), 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.
- 3. (II) FY 1983 Planned Program: Continue interface development started in FY 1982. Start planning for testing and insertion of the interfaces being developed.
- 4. (B) FY 1984 Planned Program: Continue interface development and complete planning for and start testin; and insertion of the interfaces being developed.

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Project: #0107
Program Element: #2.80.10.A
DOD Mission Area: #345 - Tactical Communications

Title: Modifications to Army TRI-TAC Interface

Title: Joint Tactical Communication (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

5. (U) Program to Completion: Complete the interfaces. Initiate new software efforts to develop interface with the EUROCOM (digital) system and the EUROCOX (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.

- 6. (U) Major Milestones: Not Applicable.
- 7. (U) Resources (\$ in thousands):

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total stimated (st
RUTE						
Funds (current requirements)		5057	5068	4820	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)		5072	5197	~	Continuing	Not Applicable

Decrease in FY82 and 83 were due to application of revised inflation indices.

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.

Other Appropriations: Not Applicable.

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FY 1985 KDIE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #0110

Program Element: #2.50.10.A DOD Mission Area: #345 - Tactical Communications

Title: Mobile Subscriber Equipment (MSE) Title: Joint Tactical Co. munications Program budget Activity: e4 - 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 on the extremely mobile modern battlefield. Mobile Subscriber Equipment (MSE) will reduce the delays inherent in removing and reinstalling communications with each tactical movement, and will significantly improve the commander's capability to effectively command his forces under virtually all tactical situations. The system will be deployed to satisfy the direct communication requirements of mobile users who must communicate both with one another and with static subscribers via tactical switched communications. MSE will meet the requirements for the transmission of both voice and data information within the division area. hajor characteristics of the MSE system are: (1) high mobility, to provide continuous communications during the dynamics of combat; (2) direct dial user-to-user capability; (3) "private line" communications; (4) secure, jam-resistant information transfer; (5) interface with static switched communications equipment and net radio. MSE was designated a major system on 12 December 1977; it is part of the IRI-TAC system architecture. A wission element need statement (MEAS) for MESS thus approved by the Deputy Secretary of Defense on S January

- B. (U) RELATED ACTIVITIES: All Services and the National Security Agency are participating in the development of MSE through their respective 1k1-1AC programs. Development efforts in the Army related to the MSE program are conducted in Program Element 2.80.10.A under Project bill - bigital Group multiplexer family, bild - Other Service Assigned TRI-TAC programs, D116 - Facility Support Element, Dill Short Range Wideband Radio Assemblages, D119 - Modular Record Traffic Terminal (MRT1), D172 - Net Redio Interface (NRI), D178 coint Test Element Support, D222 - Automatic Communications Central Office AM/ITC-39 family, and D104 - Support to the IK1-IAC Office per 1-0D 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 (ESE) developments. They represent other elements of the, Army's Integrated Tactical Communications System (INTACS) that, with MSE, insure a viable and integrated program. Centralized manage, ent by the Office of the Secretary of Berenac (050) through the IRI-TAC Office Insures that there is no duplication of effect in the related Army, other Service-assigned, and DOD agency-assigned TKI-TAC programs.
- C. (U) WORK PERFORMED BY: MSE Office, US Fray Communications-Electronics Command, Fort Monmouth, NJ.

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Project: #1010
Program Lieurnt: \$2.50.10.A

1900 Mission Area: #345 - Tactical Communications

Title: Malile Subscriber Fortpment (MSE)

Title: A int location to contentions Program

Budget Activity: For content Programs

D. (B) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (b) FY 1981 and Prior Accomplishments: Completed OSD Program Review. Obtained Mission Area Analysis (MAA), Joint Chiefs of Staff (JCS) approved Joint Operational Engineering (Chiefs of Staff (JCS) approved Joint Operational Engineering (Chiefs), between Intelligence Agency (BIA)-validated MSE threat and OSD approved Mission Element Need Statement (Chief). Conducted joint development discussions with the Federal Republic of Germany and the Netherlands; however, agreement was not reached an cooperative development. Prepared for US unilateral development, commencing with a thorough review of requirements and Tevelopment philosophy. Prepared draft system specifications and procurement documentation.
- 2. (0) FY 1982 Program: Complete requirements and development approach rationalization. Coordinate and finalize draft system specifications and procurement documentation.
- 3. (U) FY 1983 Planned Program: Prepare and issue Request for Proposal (PFP) to US industry for MSE development. Establish source selection evaluation process. Coordinate with MSE for the parallel development of MSE communications security equipment (COMSEC). Initiate planning for test and evaluation program.
- 4. (U) FY 1964 Planned Program: Coordinate and finalize test and evaluation program requirements. Perform RFP bid evaluation and negotiation and award contract for 1855 development.
- 5. (U) Program to Completion: Complete development contract, conduct Development Test and Evaluation/Initial Operational Test and Evaluation (DTE/10TE), conduct Army Systems Acquisition Review Council (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

Program Element: #2.80.10.A DOD Mission Area: #345 - lactical Communications

Title: Mobile Subscriber Equipment (MSE)

Title: Joint Tactical Communications Program
budget Activity: 14 - Tactical Programs

6. (U) Major Milestones:

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1982 Submission
ASARC I	Sep 79	Sep 79
OSD Program Review	Nov 79	tlov 79
MENS approved	Jan 80	Jan 80
Issue KFP	Jul 83	Jul 81
Award bevelopment Contract(s)	hay 64	Aug 82
DIE 1/OTE 11 Start	Sep 85	Sep 66
ASARC 111	Nov 86	Nov 87
Award Production Contract	Oct 87	Jan 88
First Unit Delivery	bec 58	Jan 90

Differences in milestone dates from the FY 1982 submission are due to Army attempts, after cooperative development failed to occur, to reduce system requirements and accelerate fielding.

7. Resources (\$ in thousands):

	FY 1961 Actual	FY 1982 Estimate	FY 1983	FY 1984	Additional	lotal Estimated
RLTE	Actual	ESTIMATE	Estimate	Estimate	to Completion	Cost
Funds (current requirement)	113	8035	2149	2003	Continuing	Not Applicable
Funds (as shown in FY 1982	2208	11814	30241	-		157200

Decrease in FY 1981 due to delays in award of development contract caused by multinational negotiations. The decrease in FY 1962 is due to a Congressional funding cut. The large decrease in FY 1983 is due to a change in the scope and definition of the program.

Other Appropriations: Not Applicable.

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FY 1983 RULE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D111

Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Digital Group Bultiplexer
Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

(U) DETAILED BACKGROUND AND DESCRIPTION: The Digital Group Bultiplexer encompasses a family of digital multiplexers, modems, cable drivers, pulse restorers and cable orderwire units for employment in Army Communications Control Facilities and radio assemblages and for use in a stand-alone mode. This equipment provides the capability to make efficient use of cable and radio facilities by combining a number of communications subsystems on a single cable or radio system, combining a number of collocated subscribers on a single cable or interconnecting large groups of subscribers via a transmission system. Development and operational testing was completed in February 1961, and a Department of the Army in-Process Review was held in July 1981, which led to type classification of the Digital Group Bultiplexer equipment and assemblages. Production contract award is scheduled for December 1981.

- B. (U) ESLATED ACTIVITIES: All Services are participating in the development of the Digital Group Multiplexer (DOM) equipment and assemblages through their respective Tki-TAC programs. Development stretts within the Army related to the DCM program are conducted in Program Element 2.60.10.A under Project b'10 - Mobile Subscriber Equipment (NSE); bli4 - Other Service Assigned IRI-TAC Programs, D116 - Facility Support Elevent, D117 - Short Eleve Wideband Radio Assemblages, D117 -Short Range Wideband Radio Assemblages, 0119 - Hodulir Record Traitic Terminal (1997), 0172 - Net Radio Interface (BRI), p1/8 Joint Test Element Support, D222 - Automatic Communications teatral Utilice Ab. 110-39 family, and D104 - Support to the TRISTAC Office per DDD Directive 5146.7, and in Program Element 3. 1.42.A, Satellite Communications Ground Environment, under D456 - Tactical Satellite Communications Systems (TACSATYON). These related programs do not duplicate Hightal Group Multiplexer (DOM) developments. They represent other elements of the Army's Intertated Tactical Communications System (INTACS) that must be interoperable with BOM to insure a viable cost integrated program.
- C. (U) WORK PERFORMED BY: Project Manager, Multi-Service Communications Systems (MSCS), US Army Communications-Electronics Command at Fort Monagenth, Rd. The Third Group Multiprexer (DCM) development contractor is Raytheon Corp., Sudbury, MA.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE TROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: The Office of the Secretary of believe (USD) formally assigned the DOM task to the Army in 1974. This program has developed 15 multiplexers, modems, cable drivers and orderwise control units and 4 assemblages. These items successfully passed bevelopment and operational lesting and were type classified standard in August 1961.

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Project: #D111

Program Element: 22.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Digital Group Multiplexer

Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: 14 - Tactical Programs

- 2. (U) FY 1982 Program: Award a 4-year multiyear production contract for the 15 DGM devices and 4 assemblages, monitoring for BCH and assemblages for the Army, BCM for the Air Force, and monitor completion of engineering effort. Begin planning for fielding in FY63.
- 3. (U) FY 1983 Planned Program: Continue Government weathering of the production contract and initiation of the development effort for the AN/IKC-178. Begin package formulation for second procurement in FY84. Continue government monitoring of the production contract. Begin acceptance testing. Finalize procurement package and solicitation program to completion. Accept equipment and field. Award initial production effort for At./IRC-178.
- 4. (U) FY 1984 Planned Program: Continue monitoring of the production contract. Prepare for an award of follow-on production contract.
 - 5. (U) Program to Completion: This is a continuing program.
 - 6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
FSED Contract Award	May 1975	No Submission
Development Test & Initial Operation Test & Evaluation Start	January 1979	No Submission
Development Test & Initial Operation Test and Evaluation Completion	February 1981	No Submission
Decision to Proceed Production	28 Jul 81	No Submission
Initial Production Contract Award	December 1981	No Submission

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Project: #b111

Program Element: #2.80.10.A

TOD Mission Area: #345 - Tactical Communications

Title: Bigital Group Entitiplexer

Title: Joint Taction Communications (TRI-TAC) Program

Encict Activity: 64 - Tactical Programs

Nu jor Nilestones	Current Hilestone Dates	Milestone Dates Shown in FY 1982 Submission
Initial Production Deliveries Start	September 1903	No Submission
initial Operational Capability (for Assemblages)	September 1985	No Submission
Initial Operational Capability Date (for Assembiages)	September 19/5	No Submission
7 (II) Recourage (\$ in thousands):		

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

RDTE	FY 1901 Act no 1	FY 198.	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	2851	1445	5296	2 340	Continuing	Not Applicable
Fonds (as shown in FY 1982			2230	• 7	001111111111111111111111111111111111111	moe imprisedore
submission)	2.551	1449	1127	-	Continuing	Not Applicable
Quantities (curre t requirements)	*					
Quantities (as she n in FY 1982						
sulmission) *	-		-	-	-	-

The increase in FY64 RD1E funds was due to increase in requirement for Test Program Sets. The increase in FY83 RDTE is due to new requirements for the AN/TRC-176 (division benefit DDM assemblage).

* 576 boxes of 15 different Digital Group Bultiplexet (DDB) hardware items and 3 each of 5 types of assemblages housing a

mix of the 15 different DGM items.

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Project: #D111

Title: Digital Group Multiplexer

Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

Other Appropriations: Other Procurement, Army

Funds (current requirements) Funds (as shown in FY 1982	15300	13500	88600	32100	Continuing	Not Applicable
submission) *	-	-	-	-	-	-
Quantities (current requirements) ** Quantities (as shown in FY 1982	-	-	-	-	-	-
submission) *		-	-	-	-	-

 ${ t *No}$ submission of a separate CDS last year.

**Represents the procurement of a mix of 15 different Digital Group Multiplexer (DCM) hardware items for use as interoperable terminal components and in the stand-alone mode or as integral parts of 6 different transmission assemblages. These items will be fielded as cohesive systems TAM The TRI-TAC Distribution Plan.

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FY 1983 RDFE COMORDS: At The PIPTIVE STONERY

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Modular Resemble Fratfie Terrinal (MRTT) consists of secure tactical record traffic terminal equipment and assemblages which will signiffe att. improve the speed and accuracy of tactical record communications while reducing the manpower dedicated to traffic-bendifing functions. The MRTT provides facilities to compose, edle, process, transmit, receive, distribute, and switch recent traffic without the generation of intermediate documents. This system will replace the obsolete, unreliable, rampower intensive, low-speed record traffic equipment (primarily teletypewriters) presently used for tactical record communications at all echelons of command. To levels of user employment are planned: Single Subscriber Terminals COT) and Hodular Tactical Communications Centers (NACC). The SST consists of individual devices configured as terminals to meet individual over requirements. The NTCC consists of an assemblage of SST's, an optical character reader, line printer, tactical dipotal tacsimile, AN/TTG-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, a d will greatly reduce the time clapsed from release of a message until it is in the addressee's bands. This will occur through the elimination of multiple message preparation in varying formats (e.g., written, typewritten, punched paper tape, teletypewritten 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 u.a. This program uses proven, available commercial and military equipment and technology, and represents a low-to-moderate technological risk for development.
- B. (D) RELATED ACTIVITIES: All services and the National Security Agency (FSA) are participating in the development of the Modular Record Traffic Terminal (MRTT) through their respective TRI-TAC processes. Development efforts within the Army related to the MRTT program are conducted in Program Element 2.20.10.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 Fest Element Support, D222 Automatic Communications Central Office AN/TTC-39 tamily, and D104 Support to the TRI-TAC Office per D0D Directive 5148.7, and in Program Element 3.31.42.4, 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.

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Project: #D119

Program Element: #2.80.10.A

DOD Mission Are: #345 - Tactical Communications

Title: Modular Record Traffic Terminal (MRTT)

Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Tactical Programs

C. (U) WORK PERFORNED BY: Project Manager, Multi-Service Communications Systems (MSCS), US Army Communications Electronics 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 1981 and Prior Accomplishments: The Army and the other Services have participated in the TRI-TAC MRTT Study Program since April 1976. MRTT task was formally transferred to the Army on the 10 May 1977 by the Office of the Secretary of Defense (OSD). In addition, the message switch utilized in the MTCC (AN/TYC-11) was transferred to the Army on 26 March 1979. The Joint Service Operational Requirement was approved in November 1978. The Baseline Cost Estimate, Procurement Plan and Determination and Findings (D&F) were validated and approved less the YC-11 in FY 1978. Updated documents incor porating the AN/TYC-11 module and its effects on the cost and schedule were completed in January 1980. The Request for Proposal (REP) for the SST Full-Scale Engineering Development (FSED) program was released to industry in September 1979 and the RDTE contract was awarded to Singer/Librascope in September 1980. The Optical Character Reader (OCR) was designated a Nondevelopmental Item (NDI) in FY81. Preparations were begun to procure a commercial OCR with minimal modifications. A solicitation was issued for manufacturer information and a market survey was begun. The Improved Message Facility (IMF) was approved as a near-term solution for the Army to meet some of the operational requirements for an MTCC. A feasibility test of an AN/TSC-58 assemblage, with an Improved Message Facility (IMF) processor, was successfully completed, and planning began for Full-Scale Development of an IMF Product Improvement.
- 2. (U) FY 1982 Program: Award and monitor contract for 12 test models of the Optical Character Reader (OCK) and take Continue Full-Scale Development (FSD) of the IMF. Participate in a Cost and Operational Effectiveness Analysis (COEA) of Mobile Tactical Communications Center (MTCC) and alternatives, prepare for and conduct an Army System Acquisition Review Council (ASARC) II, and issue solicitations for MTCC development proposals. Complete Single Subscriber Terminal (SST) design, conduct Critical Design Review (CDR), and begin system fabrication; initiate Development Test and Initial Operational Test (DT/IOT) plans and monitor Contract Development. Prepare DT/IOT test plans for IMF.
- 3. (!!) FY 1983 Planned Program: Continue to monitor and evaluate the contractor performance on the SST. Continue fabrication efforts on the SST, conduct DTE/10f of SST, conduct Development Acceptance In-Process Review (DEVA IPR), type classify and prepare for Full-Scale Development (FSD) contract award. Conduct DT/10T of IMF, prepare for production contract, award and conduct IPR. Award Initial Production contract for Optical Character Readers (OCR).

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Project: #0119
Program Element: #2.80.10.A
DOD Mission Area: #345 - Tactical Communications

Title: Modular Record Traffic Terminal (MRTT)

Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: #4 - Testical Programs

- 4. (II) FY 1984 Planned Program: Award Initial Production contract for SST. Award FSD contract for MTCC initial Production contract for IMF kits to product-improve AN/TSC-5B and AN/MGC-19A assemblages. Begin assemblage modifications (Product Improvement).
- 5. (B) Program to Completion: Complete Product Improvement of 133 AN/TSC-58 and 400 AN/MGC-19A assemblage by adding the Improved Message Facility (IMF) capability in FY 1985 and FY 1986. Monitor contractor development of Mobile Tactical Communications Center (ITCC). Complete DT/IOT of MTCC, conduct type classification and prepare for initial Production contract award in FY 1986. Award Initial Production contract for optical character readers. Conduct and complete Development Test and initial Operational Test (DT/IOT) on MTCC, prepare and complete ASARG/DSACC reviews on MTCC, type classify, prepare for and award initial production contract. Field all items.

6. (U) Major Milestones:

	Current	Milestone Dates
Major Milestones	Milestone Daves	Shown in FY 1982 Submission
	SST / OCR / ME / MICC	SST OCR MTCC*
FSED Contract Award	Sep 80/N/A/Jin 82/Jan 84	Sep 80 Sep 81 Sep 81
Development Test and Initial		
Operational Test and Evaluation		
Start	Feb 83/8/A/O 1 2 1/TBD	Sep 82 Sep 83 TED
Development Test and Initial		
Operational Test and Evaluation		
Completion	Jol 83/N/A/B c 83/TBD	Har 83 Feb 84 TBD
Decision to Proceed with		
Production	Sep 83/Apr 83/May 83/TBD	May 83 Apr 85 TBD
Initial Production Contract		
Award	Oct 83/May 83/Oct 83/TBD	Jan 83 May 85 TBD
Initial Production Deliveries		
Start	Apr 85/Oct 83/Sep 84/TBD	Jul 85 Jun 85 TBD

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Project: #D119

Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Modular Record Traffic Terminal (MRTT)

Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

Milestone Dates Current

Milestone Dates SST / OCR / IMF / MTCC Shown in FY 1982 Submission OCR MTCC*

Initial Operational Capability

Mar 86/N/A/Jun 85/TBD

Apr 86 N/A TBD

SST program schedule was changed after award of contract and reevaluation of the proposed pre-award schedule. OCR was designated a Mondeve opment Item in FY81, which greatly reduced schedule. IMF is a new item to be used as an interim solution for meeting the urgent MTCC requirements quickly. MTCC schedule is dependent on ASARC II decision in late FY82.

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

Major Milestones

DOTE.	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	6313	6863	9791	24239	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	8713	8130	12439	-	30868	69100

Quantities (current requirements)* Quantities (as shown in FY 1982 submission)

* 40 SST's

10 MTCC's with AN/TYC-11's

10 $IMF^{\dagger}s$ (AN/TSC - 58(MOD))

\$3 1MF's (AN/MCC - 19 (MOD))

Decrease in FY 1981 and decrease in FY 1982 RDFE funds are due to programing adjustments made to match a shift in effort caused by a delay in the FSD contract effort. Decrease in FY 1983 RDTE requirements is due to a delay in the MTCC ASARC II and consequent delay in the FSD contract award.

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Project: #0119 Program Element: #2.80.10.A
DOD Rission Area: #345 - Tactical Communications

Title: Modelar Record Trollic Terminal (METT)

Title: Joint Tactical Communications (TRI-TAC) Program

Budget Activity: Factorical Programs

Other Appropriations:	FY 1981 Actual	FY 1952 Estimate	FY 1983 Estimate	FY 1984 Estimate
Funds (Current Requirements) Funds (as shown in FY 1982	-	-	-	23500
submission) * Quantities (current Requirements)	-			6 IMF's 250 SST's
Quantities (as shown in FY 1982 submission) *				

* No submission was made in FY 1982 summary.

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FY 198 - MATE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D222
Program Element: #2,80,10.A
DOD Mission Area: #345 - Tactical Communications

Title: Automatic Communications Central Office, AN/ITC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKCOUND 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 bybrid (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. Message switches can be employed with or independent of the circuit switch. The AN/TTC-39 family is planned for multiservice use: trom Corps level back through 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 elements of terces and Emergency Action forces. The AN/TTC-39 family is needed to replace obsolete, predominately manual, manpower-intensive telephone central offices and obsolete, manpower-intensive, manual record traffic (messages) central offices and relays.

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 through digital techniques, and reduces manpower requirements for operation and maintenance through automation and digital technology. The AN/TTC-39 family is the lead item of the Joint Tactical Communications (TRI-TAC) Program. It will be interoperable with the Defense Communications System (DCS) and interface with systems of our allies.

B. (U) RETATED ACTIVITIES: All Services, the Defense Communications Agency, and the National Security Agency are participating in the development of the 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 DH1 - Digital Group Multiplexers; DH10 - Mobile Subscriber Equipment; DH17 - Short Range Wideband Radio (SRWbR) Assemblages; and DH19 - Modular Record Traffic Terminal (MKHT); and Program Element 3.31.42.A, Satellite Communications Ground Environment under project D456 - Tactical Satellite Communications Systems (TACSATCOM). In iddition, 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 DH4 - 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 DH04 per DOD Directive 5148.7. The Army's share (35%) of the TRI-TAC Joint Test Element is funded in project DH78 (Joint Test Support) per DOD Instruction 5148.8. Project DH6 - Facility Support Element tunds the Army support to the TRI-TAC Joint Test Program with a baseline of current inventory equipment per DOD Instruction 5148.8. DH07, a new project, provides for software and bardware changes required for interfaces between TRI-TAC and other equipment. Centralized

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Project: #9227
Program Element: #2.80.10.A
DOD Mission Area: #345 - Tactical Communications

Title: Stockitic for the Section Contral Office, ACTIVITY STATES Fraging Section Activity: Section Fraction Section Se

ranagement by the Office of the Secretary of Defense (OSD) through the TRUTAC TO Theorem that there is no duplication of effort in the related Army, other Service-assigned and DOD Aconcy-assigned the secretary.

- C. (II) WORK PERFORMED BY: Project Manager, Bulli Service Gomenications System (i. Army Communications-Flectronics Command Fort Monagouth, NJ. Contractor is GIE-Sylvania, North Contractor, 15.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Bardware develope of was nife to a FY 1972 when a Joint Service Specification was developed, and two competitive prototype contracts for Alvan ed accompens (Phase I) were awarded. Advanced Development of the AN/TC-39 continued in 1973. In 1976, a before 6 50% is Angulation Review Council (DSAPC) II was held. Full-Scale Development (FSD) was approved by the Profession of French and a Cost Plus Incentive Fee (CPIF) contract was awarded to GTE Sylvania. In May 1976, based on a carclasion that a locate of the Decision Coordinating Paper (ISF) #135 cost and schedule thresholds was to be anticipated, the Profession for the Decision Coordinating Paper program by Defense Systems Acquisition Review Council (BSARC) or incidents. The directed action constrained the development action through FY 1977 within a cumulative funding cap of \$10.5 million. In Decoder 1976, a Special Defence Systems Acquisition Review Council (DSARC) approved continuation of the profession in 1976, a Special Defence Systems Acquisition Review Council (DSARC) approved continuation of the profession of the development and schedule baseline (16-month circuit witch extension). In April 1978, Department of the Circuit continued to make and a revised TRI-TAC acquisition strategy were proposed in a DCP cover sheet revision to the Orlice of the Secretary of Defense (OSD) for final review and approval. OSD approved this revision on 21 August 1979. During 1979 Government benchmant Test and Evaluation (DTE) and Operational Test and Evaluation (OTE) on the AN/TYC-39 message switch were completed. Buring FY 1980 DTE/OTE of the AN/TYC-39 was held in March 1980, and a DSARC IIIA for the AN/TYC-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/TYC-39 and AN/TYC-39 models currently at the TRI-TAC Joint Test Facility were continued.
- 2. (B) FY 1982 Program: Continue contractor development of software for interface with other TRI-TAC equipment and support AN/TTC-39 and AN/TYC-39 models retained in the TRI-TAC Joint Test Facility.
- 3. (U) FY 1983 Planned Program: Continue contractor development of software for interface with other TRI-TAC equipment and support of AN/TTC-39 and AN/TYC-39 models retained at the TRI-TAC Joint Test Facility.

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Project: #0222
Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39
Title: Joint Tartical Communications (TRI-TAC) Program
Budget Activity: rh - factical Programs

- 4. (U) FY 1984 Planned Program: Continue contractor development of software for interface with other TRI-TAC equipment and support of AN/TTC-39 models retained at the TRI-TAC Joint Test Facility.
- 5. (B) Progra 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.

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Project: #222
Program Flowest: #2.80.10.A
Pub Mission Area: #2.80.10.A
Tactical Communications

Title: Automatic Communications Central Office, AM/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: Phys. Tactical Programs

6. (E) Major Milestopes:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Engineering Development Contract Award Frototype curtification Test (POT)	Apr 74	Apr 74
Start Message Switch/Circuit Switch	May 77/Mar 78	May 77/Mar 78
Complete Message Switch Discuit Switch Development Test and Evaluation/InftIal Operation Test and Evaluation (DTE/IOTE)	Apr 78/Nov 78	Apr 78/Nov 78
Start Bessage Switch/Circuit Switch	Jun 78/Fe! 79	Jul 78/Feb 79
Complete Message Switch/Circuit Switch Defense Systems Acquisition Review Council (DSARC) III AB/17C-39 Message Switch	.hun 79/Nov 79	Jun 19/Nov 19
Production Decision	Jul 80	Jul 80
AN/TTC-39 Production Award PS/RC 111A AN/TTC-39 Production Continuation	Sep. 80	Sep. 80
Pecision Initial Operational Capability (10C)	Jul 80	Jul 80
AN/TYC-39 Message Switch	Mar 83	Mar 83
AN/TTC-39 Circuit Switch	Aug 83	

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Project: #D222
Program Flement: #2.80.10.A
DGD Mission Area: #345 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
had et Activity: 35 - Tactical Programs

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

	FY 1981 Actual	Fy 1982 Fst + t	FY TO A	FY 1984 F. Clmare	Additional to Completion	Total Estimated Cost
Funds (current requirements)	1 - 300	92.4	9641	$f_{i+1}(\mathfrak{C}_{i-1})$	0	262606
Funds (as shown in FY 1982 submission)	7596	x. *	94.9	-	O	2574.18
Quantities (current requirements)	16	i	D.		0	16.*
Quantities (as shown in PY 1982 submission)	* 6		1)	- t	O	ln

Changes in FY81, 62, and 83 RDLE were due to of illustration of a coliminal following more suppressing more and FY81 supplemental and the FY82 manners of the changes. There are in total due to inclusion of FY72 and FY73 actuals and FY81 supplemental and the colored by a stages.

* Engineering Davistopment models include / Alg FiG-3) and k=0.0009 switches.

Other Appropriations:

Other Procurement, Army:						
Funds (current requirements)	7 ! ((n)	K. 7 =	الغيش موادية	1	448000	762000
Funds (as shown in FY 1982 submission)	549(d)	76%	es 2 at a	-	299100	512200
Quantities (current requirements)	26		1.		99	182*
Quantitles (as shown in FY 1982	• **		10	-	75	138
submission)						

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Project: #222
Propram Element: #2.80.10.A
DOD Mission Area: #345 - Tactical Communications

Title: Automatic Communications Central Office, AN/TIC-39
Title: Usfat Tactical Government (TRI-TAC) Program
Budget Activity: 3. - Lactical Programs

The changes in Other Procurement, Army Appropriations are based on changes in requirements.

*Fotal Army quantity of 182 represents 125 AN/TTC-39 (300-14me), 20 AN/TTC-39 (500-14me), and 37 AN/TYC-39 message switches.

The confidence in total estimated RDTE costs is high due to the maturity of the development program. Confidence in FY80-82 procurement costs is excellent, based on a three-year multiyear contract.

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Project: #0222 Program Element: #2.80.10.A

DOD Mission Area: 314 - Tactical Communications

Title: Automatic Communications Central Office, AN/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Programs

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 exepatibility 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/TYC-39 Message Switch (MS) began in Aug 80 and is intended to be a continuing 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 or any other switching equipment now in the US military inventory. Only minor deficiencies were identified in the tinal DT II Report for the AN/TTC-39, dated Jan 80. Of the nine (9) deficiencies, software anomalies accounted for six (0), and they are being corrected in the new software currently being tested.
- (0) All hardware deficiencies have been corrected or are being corrected by design chances prior to production model initiation. Due to hardware commonality between message and circuit switches, the EMP * ..._ indicates that the Circuit Switch can survive all expected levels of this.
- (B) The ANTIG-39 program is a family of additional transport 50, commonations switching syst as designed to provide secure, antennate, processor-controlled switching for Total absolute the language fraction. The taxity consists of hybrid (analog and digital) circuit switches (AGTH 39) or the close to the size from 150 (to line) to 75 reminations (0.00-line) and a digital accompanies which (50-line). The reminations (12400 lines) while the message switch can be a covered from the control of the free from to the free from the fire from the fire

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Project: #D222
Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Automatic Communications Central Office, AN 416-39
Title: Dist Tactical Communications (TRI-TAC) Program
Budget Activity: 64 - Tactical Programs

- (U) GTE Sylvania, Meedham, MA, was the development contractor and the test support contractor. The Army Program Manager is Program Manager, Bultiservice Communication Systems (PM MSCS), Fort Mormouth, NJ. bT was conducted by the PM, it also Communications Test Company, US Army Electronic Proving Grounds (USAEPG), US Army Test and Evaluation Communic (USAIFCOM). The US Air Force (USAF), US Navy (USN), US Marine Corps (USNC), 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 Mode (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 Buachuca, 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 Flectronic Research and Boys Topment Command (USAERADCOM) Harry Diamond Laboratories at the HDL Woodbridge, VA, research facility.
- (E) The rajor test and review milestones listed below are those roals and thresholls which have been established by OSD-approved Pecision Goordinating Paper (DCP) = 135, January 1977, Assistant Continuous of Defense (Commund, Control, Communications and Intelligence)(ASD(C3I)) Hemorandum, dated 24 July 1979, Cover Control up Update to this ICP approved in August 1979 by OSD and Secretary of Defense Decision Memorandum (SDDM), 28 July 1980.

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Project: #D222
Program Element: #2.80.10.A

DOD Mission Area: #3.5 - Tactical Communications

Title: Automatic Communications Central Office, AN/TIC-39
Title: Joint Tactical Communications (TRI-TAC) Program
Budget Activity: #4 - Tactical Lograms

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			Appro		Comp Est i	leted/Current matés
Prelic Prelic Integ Final Resca	op ml Fa D ce	ile Engineering ment Contract Award nary Design Review ted Test Pian esign Review h Development and nee Test:	Apr Sep Feb Oct	74 15		Apr 74 Sep 76 Feb 75 Dec 75
ō	,	Begin Message/Circuit Switch	May	77./kr	78	May 1/Her 78
ć	o	tomplete Ecusage/Gircuit Switch	Apr	78/160v	78	Jun 78/8e 79
DT I	1/	OT 11:				
	o	Start Mc mage/Circuit Switch	Jul	78/Fct	, 79	Jul 15/8cb 79
	o	Complete the sacge/Circuit Switch	Мау	79/Bos	, 79	May 79/Hay 80

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Project: 40222 Program Element: #2.80.10.A BOD Mission Area: #345 - Tactical Communications Title: Automatic Communications Central Office, ANAIRO-39
Title: Fint Tactic Communications (TRI-TAC) Programs
Budget Setivity: Figure in titled Programs

		Approved Program	Completed/Current Estimates
	e Systems Acquisition Council (DSARC) III:		•
0	AR/TYC-39	Mar 80	Mar 80
o	AN/TTC-39	Jul 80	Jul. 80
o	Initial Production Award	Oct 80	S-p 80
n	USAF C3 Operational Exercise		Frb 82
PATE:			
0	Start Message/Cir.uit Switch	Hay 127/des	t 87 - Fog 82/Nov 82
o	Complete Message/Circuit	S (p. 8) / F (ъ вз. — Nov 82/Mar 93

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Project: 40222

Program Element: 62.80.10.A

DOD Mission Area: - - Tactical Communications

Title: Actionatic Communications Central Office, AN/TTC-39
Title: Joint Tay Ical Communications (TRI-TAC) Program
budget Activity: #4 - Tactical Programs

Approved Completed/Current Program Estimates

FOTE:

Start Message/Circuit Switch	0ct 82/Jan 83	Dec 82/Jul 83
Complete Message/Circuit	Dec 82/Mar 83	Mar 83/Sep 83
AN/TYC-39	2Q FY 83	2Q FY 83
AN/TTC-39	4Q FY 83	4Q FY 83
	Switch Complete Message/Circuit Switch AB/TYC-39	Switch Oct 82/Jan 83 Complete Message/Circuit Dec 82/Mar 83 AN/TYC-39 2Q FY 83

- (0) During DT 11, three (3) 50-line AN/TYC-39 message switches were under test. There were two (2) 300-line and two 600-line AB/TTC-39 circuit switches undergoing DT 11.
- (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 .9771 and .9977 for the 300-line and 600-line configurations, respectively. The mean time between unscheduled maintenance actions (MTBUAA) was 52.5 hours. Organizational maintenance level mean time to repair (MTTR) figures were 51 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 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 (USASCEFG), Fort Gordon, GA.

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Froject: 6/222

Indexis 16 year: P.80.40.A

Fitts: Potential Comment (four Central Office, Another of the Project of the Proje

- (C) Due to hards, re-commonality, both the message sitebox is to be extreme to test in DT II and Operation 1 sect 1975 if were girlled to add intents and impressed to test to be section to the different formula from FECO code). Assumer, activate absence to the decorate without as sometimed to the content of the decorate with a section of the decorate formula from the decorate for
- (f) favironment qualify attour entry of the 11/10 Weshes I are not on the construction and heating and college expectative for a section is below a few interference in the configuration of the
- 2. (ii) questions lest outsellar on all 1114 to 1 000 to describe and observe to 1 000 to 100 and we successfully employed at 20 May 1000. The specific water to problem to the AC 10000 effectiveness of the AC 10000 effective entry of the describe of the College of the AC 10000 effective entry of the AC 10000 effective entry of the activities of the AC 10000 effective entry of the specific of the described effective entry of the specific of th
- (B) Buring OT II, several areas were identified is needline in a seed. The above were: Reliability, Availability, and Buintalnability (RAM), training, documentation, and softwire. To US Alay Simulation is propuring a new Program of Instruction (POI) to correct training deficienties found arrived to. The other Services along with the Arry have elected to convert the decumentation to skill performance and (SM) in a language corrections are being implemented on a time-phased basis so that baseline performs a may be achieved to the serious input on switch utilization at the Islat Bed. The first incremental software was delivered to November 1980 and seccentually tested. A second delivery in scheduled for the end of May 81.
- (U) All subsystems and support equipment were available for testing during DT II and OT II, with the exception of the AU/MSM-105 automatic test equipment.
- (B) OT II was accomplished by the United States Army Operational lest and Evaluation Agency with support of the TRI-TAC Joint Test Organization at Fort Buschuca, AZ. The United States Air Force, United States Navy, United States Marine Corps, and the Matfonal Security Agency participated in the conduct and evaluation of the tests.

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Project: #D222 Program Element: #2.80.10.A

DOD Mission Area: #345 - Tactical Communications

Title: Automatic Communications Central Office, AE/TTC-39
Title: Joint Tactical Communications (TRI-TAC) Program budget Activity: #4 - Tactical Programs

- (U) Interoperability tests and so nario play were also conducted with the Naval Telecommunications System Test Mode at San Diego, CA, and deployments to CONUS-based United States Air Force bases were mode 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 Of II was conducted with inventory tran dission in 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 to required by the language in the DCARC III SDDM. However, the Aray and Air Force independently plan to conduct (under the management of the US Aray GEA 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.
- (II) 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) a 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 a climated that the mean-time-to-repair will improve both at organizational level and at the direct support/general support level. Mean Time Between hission Failure (MTBUF) has substantially improved over the results the Atay achieved in OT II. The meanage switch deconstrated acceptable maintainability performance during OT II.
- (U) o Reliability During the 4000-pt's bours of operational testing, the circuit switch demonstrated an MTBMF of 5.0 hours (for failures of 100-percent degradation listing more than 15 winutes). Software anomalies contributed significantly to the mean time between numbeholded maintenance actions (MBMMA) figures. Software corrective action is underway, and initial results show significant improvement over of H results, buring operational testing, the message switch demonstrated an MTBMMA of 16.7 hours.

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Title: It made Common without Central Office, AN/COMMAN Title: AN/COMMAN T

1. (P) System Characteristics: The operation and technical characteristics listed below are those which have been approved by Old in Decision Coordinating Pares (OCP) 1 %, January 1977, and cover sheet update in August 1979 and the DSAEC LIL for the AMPIC-19 Circuit Switch. The deconstrated performance characteristics listed below have been derived from Covernment-witnessed Contractor Development Jesting (CDF), DT 11 and/or OT II.

OPTRATIONAL/TECHNICAL			
CH-RACTERISTICS	OBJECTIVES	DEMONSTRATED PF	RECEMANCE
AN/TTG-39 CS (600-Line/300-Line) Inherent availability (hrs) (1)	.499/.999	DT II .9958/.9948	OT 11 .9975/.9991
Mean time between mission failure (hrs)	(2)	Not measur⊕d	142.5
Mean time between unscheduled maintenance actions (hrs)	20/30	18/24	11.6/10.8 (5)
Nern (Ime to repair (min) (organiza- tional/DS)	30/30	39/51	40.5 (5)
Hean time to repair (min) (GS)	60/60	Not measured	107 (5)
Simultaneous conferences (1)	6,/4	6/4	4 (5)
waximum 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 acti)	Not measured
Ter instions per module	150/150	192/192	Not researed
Baxinum weight per shelter (1bs)	7000/7000	6709/8316	6709/8386

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Project: #D222

Program Element: #2.80.10.A

DOD Mission Area: #445 - Tactical Co. nonleations

Lite: Automatic Communications Central Office, AS/TTT-19
 Little: Joint Tactical Conventinations (TK1-TAC) Program Budget Activity: \$4 - Tactical Programs

OFERATIONAL/TECHNICAL CHARACTERISTICS	<u>em in Clubbi 5</u>	DOME OF THE TED PI	ERFORMANCE
AN/TYC-39 Message Switch (50-Line) Inherent availability (1)	.939	.995 (7	.963*(6)
Mean time between missile failures (brs)	(2)	Not againsted	116.3
Mean time between unscheduled maintenance actions (hrs)	20	30.2	16.7
Mean time to repair (Organizational/DS)	30 win	2.03 hrs	58.5 min
Mean time to repair (GS)	60	Not measured	50.6 min
Reference storage (days) (1)	10	10	10
Journal storage (days)	3.0	10	10
Standby battery power (min)	15	16.26	Not measured
Message processing time (sec) (3)	2	1.732	Not measured
Throughput character per second	9000	9534	Not measured
Bit error rate , er consecutive bits	10-10	10-10	Not measured
Maximum weight per shelter (1bs)	7000	6840	6870

NOTES:

- (1) (0) DCP performance features for which minimum thresholds for the Army have been established.
- (?) (U) No specific criteria established. User stated a desire for the switches to be capable of performing a 48-hour mission without a mission failure.
- (3) (U) Two seconds represent a mean message processing time.
- (4) (0) Demonstrated performance will be based on the results of Government testing to be conducted during BT/OT II and CUT.

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Protect: 60222
Program Elicent: #2.86.10.A
DOD 15 set a area: #345 - Tactical Communications

Title: Automatic Compensations Central Office, Page 19 Title: Joint Tation Computations (FR-90) terms but at Activity: A contical Property

- (%) (U) Figures based on average of 60%-line and 300-line (mix-h.
- (f) (U) 0.963 is a measure of operational evallability and includes maletenines and supply time.

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FY 1963 RETE CONGRESSIONAL DESCRIPTIVE STARLAY

Program Element: #3.31.45.A

Title: European Command; Command, Control, and Communications
Systems (iUCOM C2 Systems)
Budget Activity: #4 - Tactical Programs

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

DOD Mission Area: #341 - Theater Command and Control

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUARTITIES	1 Y 1961 Actual 1133	FY 1982 Estimate 4016	FY 1983 Estimate 527	FY 1984 Estimate 4948	Additional to Completion Continuing	Total Estimated Cost but Applicable	
DI158	EUCOM C3 Systems	1133	4016	527	4948	Continuing	tor Aprilianble	

BRITE BESCRIPTION OF ELEMENT AND MISSION NEED: The communications deployed to support command and control of European Command Theater buclear Forces (T.F) have been criticized by several studies since 1974 as antiquated, unsecure, and having limited capability. The TMF command and control communications (65) system as it existed one year ago is A replacement system is

needed that corrects the current deficiencies. The Army was tabled by the Assistant Secretary of Letense (Communications, Command, Control and Intelligence) to and indicate in Executive Agent for the Department of Defence to upgrade ThE operant attents as a high-priority item. This program exists to happea out that direction. Rejectione, NNY CS has been exercised by a ansiet a high frequency (BF) radio net (CEMETERY net) and a voice console telephone system whose circuits primarily traverse the Defense Communications System. When completed, this program will provide the US harogenn commander

an ultra-high frequency (UEF) satellite communications net; then other improvements as necessary to provide ethicical, responsive, secure, and survivable communications for theater and lear forces.

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lingram Llement: #3.31.45.A

Title: European come und; Command, Control, and Communications

| Systems (1.0 | 1.0 | Systems) |
| Budget Activity: | Pa - Tartleal Programs

160 Bission Area: #361 - Theater Command and Control

r. (6) LASIS FOR IN 1983 RDL HIGHER: lunding in FY 1983 is required to fund program office commistration of contract to radioterm medice in radio equipment development. Fielding it the UhF satellite ground terminals in Europe will continue.

1. (F) COMPARISON WITH BY 1982 RIJE ELQUEST: (7 in thousands)

	FY 1981	1Y 1982	FY 1963	Additional To Completion	Total Estimated Cost
Hands (current requirements)	1133	4016	527	Continuing	hot Applicable
Tunds (as shown in FY 1982 substitution)	2012	16028	2064	11326	19494

tualing decreases in all years, as compared to FY82 request, are due to rescheduling of the program necessitated by restaterent of requirements by the user. FYE2 reduction is the result of rescoping the Research and Development program and the funds appeled to higher priority programs.

i. (U) OTHER AFFECTRIATION FUNDS: (\$ in thousands):

					Total
	FX 1981	TY 1982	F 1 1983	Administrational	Estimated
	Actual	Estimate	Istimate	To the letion	Cost
Other Incurement, Army	36CU	1.52(4)	4.490G	1 5000	2329(0)
lunds (current requirements)					

lunds (as shown in 1982 suimission)

not shown

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Program Element: (3.31.45.A)

The set Temperate of Control, Control, and Composite tions bystems (c. 1993). First (c. 2)

For Activity: (3) - 1994, programs

160 Manion Area: #361 - Theater Command of central | Force Activity: 40 days of regrams

- between the start (365), with the army as these or he at, to be the entrettern as, therefore, and Communications (63) picture in hardy and to propose options for the events of they was the entrettern, as, Corrol, and Communications (63) picture in hardy and to propose options for the events of they was the first transportant 1974, and a final report, identifying deficiency requiring research, as violated to they was the first and the propose options for the events of the event their review in February to bond and first the event trained to JCS in August 1975. The JCE competed their review in February to bond and first the event to be accessing of Defense (SrCDF). Since then, the event first and the event in the event trained to the event to the event trained to the first and the event forces (INF) communications improved as the extinct addition of the first communication for meanterm improved and to the proposable case and for meanterm improved and the energy of the forces of the burden communications. There events to the burden communication of the propose the first additions by them the entry to be the communication of the propose (Amp) to manage the event made of the propose (AMP) and and updated their requirement for representing the propose the figure requirement is presently bring validated, and with here as the baseline for accompanion of the propose the figure requirement is presently bring validated, and with here as the baseline for accompanion of the light requirement is presently bring validated, and with here as the baseline for accompanion of the light requirement is presently bring validated, and with here as the baseline for accompanion of the light required by national policy. This network, the FLALIKO AKROW net, is funded under present a solutions path as required by national policy. This network, the FLALIKO AKROW net, is funded under present as 3.31.42.A.
- G. (U) FINALLE ACTIVITIES: Satellite communications term bals are being provided under PE 3.31.42.A, managed by the PE Army Satellite Communications Agency, Fort Communication and this PE.
- h. (U) Work PFERCEMED BY CONTRACTORS: his Corporation, McLean, VA; International Telephone & Telegraph Co. Butley, EJ; barris Corporation, Rochester, NY; Techdyne Systems, Alexandria, VA; Magnovox, Fort Wayne, IX. Developing organization, FS Army Communications—ystems Agency and Project Manager, Defense Communications Systems (Army), Fort Monagoth, NJ.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1961 and Prior Accomplishments: The FY76 program analyzed Communication Security (CGMSLC) design of methods, equipment, and procedures for necessary CCMSEC interface between European Command (EUCOM) and the Supreme

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Iros am Element: #3.31.45.A

the state of the s

Becommenters Allied Powers, Europe (ShAlE) and Communications inner perability of the Laund North Atlantic Treety ingentration (DATE) value communications. The FY 1979 program command to by heart front Communications survive fillity and increase analyses of Army C3 requirements. Reprogramming of the FY stands to inform the improvements in the CHYPTER bet was approved by Congress, and used to fund the fixed-station improvements. The FY SM and FY 1971 programs completed improvement of CHMLIEAN but and the European Command Central Communications, to in information of their systems south of the Alps.

- 2. (B) IY 1982 Program: Efforts in IY 1982 will focus on contract avoid in the PRIENT mellic high Frequency this radio copability. Equipment will provide reduced Endio Frequency (B1) signature to be in transit and scene communications. This between field storage sites, delivery units, and command had mosters. United to will evolve into a fully antijam system as technology advances. Ground satellite technals the dimensal indicate operational Capability (IC) is additipated. during the fiscal year. Long-range research and development studies to assess communications needs for dell erv units/storage sites in the port-1990 timeframe will be initiated. Development of concepts for ground mabile command posts will be initiated.
- 3. (U) FY 1983 Planned Program: Award RUGING bet control. Infillate of the fine of recommended Exprovements requiring longer term research and development. From will be devoted to mesoner, improvements to the basic radio design.
- 4. (U) FY 1984 Planned Program: Investigate adaptive hi betweeners and jam techniques for use in Elabach bet. Flom for advanced antijam appliques to ELOENCY Not. have into production of ABSCHOOL bet tadios.
- 5. (i) Figures to Completion: Focus on strategy to provide a Theater Society Force (IMF) communications system which can be optimally designed for the tactical nuclear force mission and invaluatable to the threat. Emphasis is to be placed on new technologies to develop a flexible system to meet the changing threat.

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Program Element: #6.32.15.2 BOD Mission Area: #225 - Air Warfare Support on a blirt flavious line investigation blood and next per lactical inograms

A. (U) RESCURCES (PROJECT LISTING): (\$ is itempates)

Project Number Title TOTAL FOR PROGRAM ELEPENT	FY 156.1 Art 0.1 72.5	1 Y 150 1 at Impre 930	777 1947 1 34 5 mart t 1 363	F 1.88 %	Zailtional Testor sletfon Continuing	Total Estimated Costs Lot Applicable
D079 Joint Sarvivability	645	930	1:63	1317	Continuing	Not Applicable

B. (P) BRILF PESCRIPTION OF ELEMENT AND BIDDION BRED: The origin bles in plantage the Army's contribution to the Tri-Service Joint Aircraft Survivability Degrams. The program of the program to the bolis of the Joint Lagistics Communication of research and advanced development programs of the Services, that results are applied to efforts that have been identified by Tri-Service working groups to be critical, technology roted to a results. They are anticipated to provide low-risk, high-payoff technology for two or more dervices. If the risk is a resident plantage the nervivability of PS aircraft in the monumelear threat environment to increase and stravalisation of the plantage of ever a given period of conflict. Research conducted is in support of and complementary to the Experied Operational Capability (RGC) for Aircraft Survivability Equipment. The JTCG/AS mission is too (1) conditions and advanced development efforts and plantage lifty in acronaution systems in a combation of the stantion of advanced development efforts and plantage of future threat environments to determine marvicability requires and analyze after one chart damage; (3) cendus attains or future threat environments to determine marvicability requires and to against of modes invivability design features; (1) plantage of interesting to the service tests and marvicability value ability as a design diselyline and coordinate point service tests and marvicability covers ability as a design diselyline and JCCG/AS is required by its charter to present single service cests to validate improved survivability design restures. The JTCG/AS is required by its charter to present single service cests to validate improved survivability design restures. The JTCG/AS is required by its charter to present and fudustry. And doint top action Communication of the JTCG/AS as a continuing program.

C. (U) BASIS FOR FY 1903 RUTE REQUEST: Band upon smallymin is combation; release to South and Asia, intelligence patiened from the 1973 Wideast conflict, the JTCC/AS, in conjunction with the research and direct year organizations of the Joint

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Process illement: 18.52.15.K 1 is Contan Argai 18.55 - Air barfore topport

Title: Joint intvivability investigations has of Activity: (c. left literage

legistics formanders, developed an overall technology plan to provide the familiagle required for the design of exclusive the first and equipment. This proconstitute is the Army parties of the joint plan. The IN 19th substituted in bloods brandatinated of internet (the measurement, to that reporting to their use; investigation at campy loser to their quest, evaluation of high performed error anternals; contained the expedient amount is believed the process that it is the expedient people armor materials are fine that it contains the high performance of the process to the process of the expedient people are particular entries on violation of high people and the expedient people are the expedient people and the people are transmission and the expedient people are processed and the people are transmission and development of processed expedient people are transmission and development of the expedience of the expedient people are transmission and development of the expedience of the exp

b. (1) Comparison kith by 1962 RMA FEGURET: (5 in thousands)

	FY 1981	FY 1982	1983	Additional To Completion	lotal Estimated Cost
RATE (current requirements)	645	930	116.3	Continuing	hot Applicable
latel. (no slowe in FY 1982 sub-ission)	639	931	1 6	lout landing	Not Applicable

Pinor Increases in FY 1961 and dicremes in FY 1967 and FY 1973 resulted from the cost in initiation indices.

L. (B) CIMER APPROPRIATION FUNDS: not Applicable

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Program Element: 19. 0.15.4 Teb Mission Acces (4.15 - Air Marfare Sunjoy) Title: Joint Yarvivaldlity investigations and yet Activity: Factorical Progress

F. (B) Highligh (ACC) hold AND BESCRIPTION: In 1971, a Joint Technical Coordinating Group on Aircraft Survivability (JECL/EL) was established under the Joint Leafstice Commanders broup to acquire and make available technology for containing nonnuclear interval littly enhancements into new atternit. The JECLAS is chartered to: (1) implement interservice citative to reduce nonnuclear vulnerability of affectuat, (2) coordinate research and advanced development in memberal survivability, and (3) a lattice Haison between technology experts and those actually designing new aircraft. In 1972, the JCC also forcedated a first-briver nonnuclear survivability program newed Test and Evaluation Aircraft Carretve-Hitty (TIAS). The TIAS program was approach by the Under Secretary of letters for head regions (in JCC DEC), and y10 million in Philosectaric Secretary of letters and in the Interval of the program over a three year period (VT E75-17 1975). As a technology-oriented program, What is vived experiments to attempt the data base, evaluate preceding in the region occurred to be budgeted by each of the certification in early 14 1975 called for united monunclear interval Hills y efforts of the Department of the program closest is to support the Anny position of the overall monunclear survivability efforts of the Department of Internation and Carretroly).

... (U) ELABLE ACTIVITIES: This program is related to any, air Force, and bary programs to insure improved aircraft survivability in making and threat environments. Coordination of these efforts is accomplished through a JACS/AS Certical critice stated by retrice representatives from each command represented on the Joint Popistics Commanders Group, implication is availed inrough joint reviews by that office and individual berifee that openetes. This program is specifically related to any frogram Element numbers 6.37.11.41(1) directly programs of the Element programs 0.61.11.41(6) directly Survivability appropriate, and labeled the Element programs of the Element and Labeled at the Element of the Elemen

H. (F) bb F PERFERNED FY: Ballistic Research Laboratory, Desdeen provine occount, De AS Army Research and Technology Laboratory, Fort Emitis, VA: Naval Research taleratory, hards of a 19 a Material and Mechanics Research Center, Wateriown, MA; Air Force Ellight Dynamics Laborator, Analysis of a 20 MB, W.

1. (F) PROGRAM ACCOMMINABLE AND TUTBEL TO COME

1. (E) FY 1983 and Prior Accomplishment: In 1961 of the control of program accomplished efforts in the areas of survivability and value substity assessment more detection; to the control of the prior of the prior of the control of the studies and

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2. 19 1992 FY 1993 Placed Progress: Support for the cowhet by matter centra; completion of encirc and a religious with the big 3 continued support of the measurement/test standardization; investigation of composite joint values and litter; continue development of combat damage telepart, radar cascal base expedite rate his fer belicopter allighers; evolution of contral his beprinted on annormal rate of evolutions. Milestics, baselies and contact, develop process Milestics, baselies and contact, develop process Milestics, baselies and contact pare parts requirements; develop and a contral evolution of the Energy (FE) process (FE) process and in the contact of the second contact of the second contact of the latest of the latest of the second contact of the latest of the second contact of the latest of the latest of the latest of the second contact of the latest of latest of the latest of the latest of la

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Complete:

Title: To lat Electronic Mission Aircraft (SPMA-1) Budget Activity: Ed. 1. Iteal Programs

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Program Element | # 1987/2007 | Edb Mission Fredrick | Programme of the Pr Wile a The Stat Foregrande Mis. Sch. Afreraft (SEMA-Y) and a material of a Table of the Manuel

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Minest note and me Mond Scotteners	. · · · · · · · · · · · · · · · · · · ·	
Appeter vid	10 A.L.T.	
Birth. I mar.	$\sqrt{V_{\rm eff}/V_{\rm eff}}$	= flore were slowles
Territory and	49.00%	- FY 1985 stort -
they and open blooms.		
Capability (1.80)	387 - 1 2 - 17	

- D. (0) CodiaBiled with it 150 knth 88 to 5 18 farthon into 17 100 and not epilicable; new start to FY 1.
- E. (P) STEEP CONSTRUCTION (Pages) (S to commends)

	yr tagl Zetenk	FY (S).	la Mesi Estimate	m tage Periods	riditional	Total Estimated
Alreraty Procurement, Army Funds (current requirements) Funds (as about in 17 1982	n		ı,	(2567436	2007100
stilled so i or)	$\mathbb{N}_{\ell} \mathbb{A}$	13 **	11/A	873	N A	$P^{-}\Lambda$
Quantities (correct reastrements) Quantities (as Sown in FY 1982	\vec{G}	13	t:	ń		
subsistint	1. X	G 3	H/A	$H \cdot A$		

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A. One gy jobs riseard Program Completion of the LY Care Cost. The section of the except manner of completion, the expeti of Engineered Londing of the Cost. The France of the expedition of the confirmed. The expetition of Costs on adding stealth Aircraft Succious its local, and the expetition of the expetition of the expective mass An inside (COEA) should dealers and teal.

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Program Flement: # 6.32.22.A

DOD Mission Area: #372 - Escort Stand-Off & Counter C3

Title: Special Electronic Mission Afroraft (SEMA-X)
Budget activity: #4 - Tactical Programs

5. (B) Program to Completion: Transition to engineering development will be accomplished. An RFP will be issued to industry, and a Source Selection Evaluation Board (SSEB) will recommend two competitive contractors to build and test prototype systems. The prototype platforms will be tested during DT/OT 1 (10FYM). These data will result in the preparation of the RCC. A single competitor will be selected to enter Fill-Scale Engineering Development (FSFD) which will transition to DT/OT II start in 4QFYME. DT/OT III will be conducted from LiFYM through 4QFYMI. Two classification will occur in 1QFYM2.

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Program Element: #6.13.02.A 1-D Mission Area: \$222 - Ground Bosed Antique and Tactical Missio Defense

Hillo: Antibaction' Missile (ATM)
Reflect Activities: 4 - Tactical Programs

1. (F) RESOURCES (PROJECT LISTING): (3 in thousands)

Protect Hember	Title	FY 1981 Actor 1	FY 1982 Estimate	17 1983 Command	57 1 344 Exit 1000	Additional To Completion	Istal Perimated Cost
	TOTAL FOR PROGRAM ELEMENT	•)	0	1.41.72	465	To Be	TR1)
$\{x^{(n)}\}$	Antita (thea) Hissile	0	o	171.72	n.55.	Determined To Be	424

B. MARIE SECRIPTION OF ELFMENT AND MISSION NUED: The Actitudical Missile offert has been initial disposition of the Detenmen Science Board on Astituctical Missiles (ANI) and a critical meed to

This program will develop and fiell a

and will initiate a long-term ACM solution. The long-term solution will address as candidates.

C. BASIS FOR FY 1983 RDTE REQUEST: Funds will initiate efforts to develop the

The planning for feeting and qualification of,

will be initiated.

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Proprior Element: Cr. 33.02.A

100 Mission area: 6222 - Ground Base: Settair and
Incited Mission (code

Title: Antitactical Missile (ATM)
Budget Activity: #4 - Tactical Programs

Mator Milestones Current Mator Milestones Milestone Pures
Alianaents lesign Decision Sep 84
AM Hardware Production Decision
AM Hardware Production (USAREUR) 163

Milestone Dates Shown in FY 1982 Submission Not Applicable

- D. (U) COMPARISON WITH FY 1982 REFF REQUEST: (\$ in thousands) Not applicable. This is a new program in FY 1983.
- E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Propried Mission Area: #6.37.02.A

Doe Mission Area: #272 - Ground Based Antigur and Tactical Mission before

Title: Antitactical Misafle (ATM)
Landget Activity: #0 - Tactical Programs

I. DUMINED BAGEROUND AND DESCRIPTION: The current is formidable in numbers and dimensive, and is of impriving quality. This throat is around with and because of its size, deployment, its widespread effect, and the current and Antifactical Missile capability is required. The ANI program in designed to possible both a near-term and a looperterm column to the tactical missile threat. The near-term solution efforts are to do the confidence and field an ability. But hardware improvements are to the

The software improvements its decemberation () at the last test solution is initially a technology last effort to develop a control of the forts will efford variants of current of defense systems, as well as totally new systems approaches.

G. RUATED ACTIVITIES: Long-term nonnuclear F(I) technology development. Is being performed by the Ballistic Missile Defense Office. This effort is related to the AV proper and is being coordinated per a non-dum of understanding between the Ballistic Missile Defense Office, the US from Missile Command, and the Eatrlot insect

H. (F) WORK PERFORMED BY: The Baytheon Component is bedford, M. Correspond above a in-bouse work will be performed by APBA-MIM, Picationy Argenal, MJ; Harry Dismond Laboratories, Abital, MD; Fallies a Besearch Laboratory And, MB; E. Army Missile Command, Redstone Arsenal, AL; and the Beliffstic Missile betwee Office, Contextile, AL. The nonrestore of art will be managed by the Patriot Project Management Willie, Municipality, AL. The long-ter effort will be nonred by the PA Army Missile Command, Redstone Arsenal, AL.

1. (U) FROMAN ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accompilabrents: Performance challes to support /imv Science Board (ASB) and beliense Science Pourd (DSB) stilles on Antitactical Billistic Misceller (ASBM) has resulted to data useful in supporting concept definition.

Program Element: #6.33.02.A DOD Mission Area: $\frac{\#2.22}{2}$ - Ground Based Antiair and Tactical Missile Defense

Title: Antitactical Missile (ATM)

Budget Activity: #4 - Tactical Programs

FY 1982 Program: Near-Term: Systems analysis and concept definition will be accomplished to permit the definition of software requirements to the level to support detailed software design. Long-term: Initiate a program for tac-

tical missile vehicles for establishing a data base. Postulate modifications to existing air defense systems to perform Antitactical missile functions (radar acquisition/tracking and missile guidance). Other Service and agency technologies will be reviewed for applicability and usefulness.

- 3. FY 1983 Planned Program: Rear-term: Concept definition and the necessary simulation modifications required to support concept evaluation will be completed in early FY83. Armaments performance trade-off analysis and definition will continue. Tactical missile study efforts will continue. Long-term: The technology hase efforts will generate a
- FY 1984 Planned Program: Near-term: Armaments performance trade-off analysis and armaments system definition design selection. Initial analysis of tactical miswill be completed to the point to support sile vulnerability to conventional warheads will be completed. Demonstration flight software requirements will be defined and preparation will be made for a flight test demonstration. long-term: Develop generic systems and perform trade-off analyses

to establish a base inc.

5. Program to Completion: Near-Term: Flight tests will be conducted initially to prove out the software modification and validate simulations, and later to demonstrate performance of the modified tests. The program will then proceed into production as a proplanned product improvement. Long-term: A system or systems to provide an Antitactical Missile capability for the field Army against the tactical missile threat will be developed.

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FY 1993 PDIE CONCRESSIONAL DESCRIPTIVE STREAMY

Program Element: #6.33.03.A

Title: Witiple Launch Po ket System (MLES)
Terminal Guidence Larhead (TGW)
Budget Activity: % - Tactical Programs

DOD Hission Area: #223 - Close Air Support and

Interdiction

A. (U) DESCURCES (PROJECT LISTING): (3 in thomsands)

Project Eurber	Title TOTAL FOR PROGRAM ELEMENT	FY 19:1 Actual 2:1	Fy 1982 Fet Ime of 2003.	FY 1733 Entimate 16407	Factories (127, 1	Additional to Completion [3830]	Total Estimated Cost 197791
D216	(MLRS Terminally Guided Warhead)	281	2081	16407	31224	135390	160.01
	Quantities	O	n	0	O	To Be Deterate	ed

- R. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The company of a Tending villance Washead (FC) for the Multiple Launch Rocket System (MLRS) envisions the attack of armored causets from above the Multiple Missions the attack of armored causets from above the Missions and lethal submunitions dispensed from an MLRS rocket. There is an argument need for an autonomous, to the control indirect five and forget capability to defeat hardpoint targets such as armored vehicles and equipment below thereby reducing their presentation rate. The TGC for the MERS will contain to is an committed into the central battle, or a to six terminally guided submunitions packaged within the rocket warhead section. The Army intends to levelop this to 4 in cooperation with France, Germany, and the United Kingdom.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: The Concept Defini ion study controlled 101 be completed in late FY 1982 and the following activities accomplished in FY 1983:

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Program Element: #6.33.03.A

Title: paltiple Launch Rocket System (MLRS)
Perminal Guldance Warheld (TGW)
Budget Activity: F4 - Tactical Programs

DOD Mission Area: #223 - Close Air Support and Interdiction

- 1. (U) Determine the Best Technical Approach (BTA).
- 2. (U) Issue the RFP for the Demonstration and Validation Phase.
- 3. (U) Conduct multinational source selection evaluation.
- 4. (U) Award Demonstration and Validacion Phase contract (40FY83).
- 5. (U) Complete Demonstration and Validation Phase MOU supplement.

A multinational (US/DE/GE/FR) evaluation team will evaluate the Concept Definition Studies, establish a best technical approach, and prepare the MLRS TGW Validation Phase Specification and Request for Proposal. It is emphasized that both the cost and milestone data contained in this report represent the Army's best estimate prior to conduct of concept definition studies. The above cost estimates assume that the infrared seeker being developed in the Defense Advanced Research Project Agency's "Assault Breaker" technology demonstration is directly applicable to the TGW requirement. The costs further assume that only one contractor team will be advanced into the system Validation Phase. When completed, the concept definition studies will enable refinement of cost and schedule data. Current milestone projections are:

Milor Milestones
Approve MOU Supplement
Award Concept Definition Contracts
Complete Concept Definition Studies
Complete Army Systems Acquisition Review Council I
Award Validation Phase Contract(s)

Projected Completion Date
April 1981
October 1981
June 1982
February 1983
September 1983

Actual Completion Date September 1981 December 1981

Future milestones and projected completion dates will be determined during evaluation of the Concept Definition studies.

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UTIGLASSITIES

Irogiam Floment: #6.35.03.A

Title: "Olitiple langel" for System (MLSS)
Tithinal office thead (TGV)
Budget Activity: Clear Programs

Loo Mission Area: #223 - Close Air Support and Interdiction

io. (T) Commands):

RITE I/	" FY 1981	LX 7.03	Ex Tost	Additional To Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in the FY 1982)	281	2999	16497	169614	189791
submission)	7.81	2957	16785	170842	192405

11 South was reprogramed from the FY81 funding to basic MLRS program because the international negotiations delayed the TGW growram such that the funds could not be used. Remaining variances result from indices adjustments.

E. (6) OTHER APPROPRIATION FUNDS: Provided that the US does outer into a loint development program with its European parthere, those nations will fund a portion of the development costs. The proportionate shares to be funded by each nation will be de ermitted after completion of Concept Definition studies and during negotiations of the Validation Phase Memorandum of Understanding. The current profile assumes that the US is proceeding unilaterally. At this time, there are no other US appropriations visualized for the program.

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Program Element: #6.33.03.A

DOD Mission Area: $t^2 23 = Glose Air Support$ and Interdiction

Tire: Mailtiple Lausch Nochet Sestem (ALRS) Catalinal Galdance With of (LAW) Bodger Activity: e4 - Tactical Frograms

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Efforts to provide an indirect fire terminal boming capability were initiated in 1970 on the hypothesis that a terminally guided system could be effective if deliver d by a parent system to a preselve ted point in space, dispersed from a delivery vehicle, and consent to decelerate to a low velocity, allowing time for a seeker to automatically scan, locate, track, and guide the heating missile to the tar.et. Between 1971 and 1976 a series of demonstration tests were conducted. In conjunction with these tests, basic seeker technology was being improved. Imphasis was placed on infrared and millimeter wave seekers. Subsequent studies conducted by the Army, although limited in scope, have shown that smark or guided munitions provide large increases in both mission and cost effectiveness. In June 1976, the FY 1977 Authorization Conscrence Report authorized \$5 million to the MLRS program with the understanding that the Army would include a terminal howing option for the system. In December 1977, the Army was advised that the basic MLRS program would not be accorded OSD support unless the Army reached agreement with its NATO allies for a loint development program. This admontshment was repeated in the Defense Systems Acquisition Review Council (DSARC) I decision memorandum in February 1977. The Culver-Kunn legislation was quoted to emphasize both admonishments. Since that time the Army has been involved in a series of continuing discussions: first, with representatives of Germany and later with representatives of the United Kingdom and France. These discussions led to formulation of a formal Memorandum of Understanding (MOU) which was quadrilaterally executed in July 1979. During negotiation of this EdU, it became clear that the Europeans desired to fully participate in the management of a future development of a Terminal Cullance Warhead if one should be required. The MOU was followed by a quadrilaterally developed Material Equipment Characteristics Document which was signed in May 1980, and a Declaration of Intent on the part of the four nations to negotiare an MOU supplement that provided for joint development of the TCT. The Declaration, which was signed in July 1980, provides for:

- 1. (U) Conduct of joint studies for Concept Definition
- 2. (U) Development of a quadrilaterally approved Recuest for Proposal
- 3. (U) Joint evaluation of contractor proposals on the basis of the following considerations:
 - (a) (U) Cost
 - (b) (B) Schedule

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Program Element: #6.33.03.A

Title: Multiple Launch Bocket System (MLRS)
Terminal Guldance Varhead (TGW)

DOD Mission Area: #223 - Close Air Support and

Interdiction

Budget Activity: #4 - Tactical Programs

(c) (U) Technical

(d) (V) Miltinational work-sharing arrangements

(U) Management

- 4. (ii) Joint funding for Concept Definition not to exceed \$2 million per nation (subject to availability of nationally authorized/appropriated funds).
 - 5. (U) Right of each nation to own the studies when completed
 - 6. (U) Mutually agreeable contracts administered by the US Government.
 - . 7. (U) Source selection procedures that provide for multinational participation.

The above Declaration of Intent (DOI) led to a formal supplement to the Basic MLRS MOU. That MOU supplement was negotiated and quadrilaterally signed in September 1981. Although it is the expressed desire of all participants to jointly enter a development phase at a later date, provisions of the MOU are limited to Concept Definition. Accordingly, after completion of Concept Definition, each participant is free to unliaterally pursue his own program alternative, or two or more of the partners may agree to proceed as a consortium. Since the basic MOU, validated by the Under Secretary of Defense for Research and Engineering in July 1979, commits the US to perform beint studies, the Army is pursuing that course of action. By so doing, it can be determined which companies are interested, how they intend to team internationally, and which technical approach provides the four governments the best possibility for developing a cost-effective system.

G. (U) RELATED ACTIVITIES: The Under Secretary of Defense for Research and Engineering directed the Defense Advanced Research Projects Agency (DARPA) to develop the emerging technologies and demonstrate the potential of a low-range antiarmor capability. The resulting DARPA technology demonstration, known as "Assault Broaker," will use a long-range Army corrier missile with midcourse correction capabilities, an Air Force radar system to locate/track targets and provide guidance to the carrier missile, submissiles with infrared terminal homing TGSM (Terminally Guided Submunitions), and nonhoming target-sensing submunitions called SKEET. The demonstration is to be conducted from January 1981 to March 1982. The Army,

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Program Element: #6.33.03.A

DOD Mission Area: #223 ~ Close Air Support and Interdiction

Title: Multiple launch Rocket System (MLRS)
Terminal Guldance Wa.head (TGW)
Budget Activity: F4 - Tactical Programs

through its Missile Command, has been directly involved as the contracting and coordinating agency for DARPA to obtain and test the carrier missiles, submissiles, and submonitions. Although Assault Breaker was not initiated to validate MLRS-TGW, MLRS has influenced the way DARPA has proceeded through the initial stages of its demonstrations. The most significant MLRS influence is the sizing of the TCSM. DARPA's TGGM was sized at a 25° so that six of them could be packaged into the MLRS warhead. At this juncture, no incompatibilities have been found between Assault Breaker and the seeker requirements that are visualized for the MLRS TGW. The MLRS-TGM program sched by adjustes that the Concept Definition studies and the Phase III Assault Breaker demonstrations will be completed at about the same time. This will assure that the maximum amount of data will be available to the multinational report that will confuse the Correct Definition studies. Day-to-day involvement of the Army Missile Command's Advanced Systems Concepts Office in the Assault Breaker demonstrations assures that duplication of effort between Assault Breaker and black-TGM is minimized.

- H. (U) WORK PERFORMED BY: This program is sampled by the 121 broader Mon. cr. A contractor has not been selected. The Vought Corporation of Dallas, Texas, prime contractor for the cont
- I. (U) PROGRAM ACCOMPILITIEIENTS AND FUTURE PROVIDENTS:
- 1. (B) FY 1981 and Pilor Accomplishment: No funds were appropriated or 70% it. IT 1976 through FY 1979, but the Army Missile Command participated in forums and conducted studies to determ by the angle delitity of a TCW to the MERS. These efforts included: (a) General Support worket System type of Study to be 1976, (c) Department of the Army Terminal Guidance Symposium = 1978, (c) General Support worket System type of Study to be 1976, (c) Department of the Army Terminal Guidance Symposium = 1978, (c) General Support worket System type of Study to be 1976, (c) Department of the Army Terminal Guidance Symposium = 1978, (d) Continued studies by the Advanced Systems Content to the 1977, (e) Preton est Definition planning and evaluation efforts by the Army Missile Laboratory, Ballistics Research Laboratory, corry Diamond Exhausteries, Vought Corporation, Multinational Source Selection Board, and the Project Office.
- 2. (U) FY 1982 Program: Five contracts were awarded by performance of Concept Definition studies. Evaluation of the Concept Definition studies will be completed by a multipational team.
 - 3. (0) FY 1983 Planned Program: A Validation Phase FaD contract will be awarded and R&D efforts will be initiate.

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Program Element: #6.33.03.A

Title: Multiple Land. Theket System (MLRS)
Terminal Guidance Warhead (TGW)
Budget Activity: #4 - Tactical Programs

DOD Mission Area: #223 - Close Air Support and

Interdiction

4. (U) FY 1984 Planned Program: During this phase of design validation and development, the contractor(s) will continue component design, design validation, engineering aluation, component fabrication, testing, and system integration with the MLRS prime contractor.

5. Program to Completion: Tentative IOC planned for This date must be reviewed after accomplishment of Concept Definition Studies.

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FY 1983 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6 33.16.A

DOD Mission Area: #222 - Ground-Based Antisir and
Tactical Missile Defense

Title: Advanced Rocket Control System Endeet Activity: #4 - Tactical Programs

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

Froject Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 21178	FY 1982 Estimate	FY 1983 Estimate 27869	FY 1984 Estimate 53992	Additional To Completion 32228	Total Estimated Costs 135267
D692	Advanced Rocket Control System	21178	o	27869	53992	32228	135267

- B. (U) BRIEF DESCRIPTION OF ELFMENT AND MISSION NEED: Program content is SECRET "Limited Distribution Special Access Required," precluding further description in this summary. Access to information is controlled by the Deputy Chief of Stiff for Research, Development, and Acquisition, Department of the Army.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Continue RDTE effort.
- D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands):

	FY 1981 Actual	FY 1982 Estimate	Fy 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	21178	0	27869	53992	32228	135267
submission)	2 6038	15,000	Not Shown	Not Shown	Not Shown	Not Shown

Details on Funding changes are available upon request in accordance with paragraph B above.

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Program Element: #6.33.16.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: Advanced Rocket Control System

Budget Activity: #4 - Tactical Programs

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army Funds (current requirements) Funds (as shown in FY 1981	0	0	0	8500	169900	178400
submission)	Not Applicable	Not Applicable	Not Applicable	Pot Applicable	Not Applicable	Not Applicable

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Program Element: #6.33.16.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: Advanced Rocket Control System
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKCROUND AND DESCRIPTION: Details may be provided in accordance with paragraph B above.
- G. (U) <u>KELATED ACTIVITIES</u>: This project is related to work in other Army technology programs. Duplication of effort is avoided due to access to the project being strictly controlled and limited to specific Department of Defense individuals involved in managing related technologies.
- H. (U) WORK PERFORMED BY: Government in-house laboratories and contractors.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: Details may be provided in accordance with paragraph B above.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMPARY

Program Element: #6.33.20.A

Title: Corps Support Weapon System (CSWS)
(Formerly Assault Breaker)
Budget Activity: #4 - Tactical Programs

DOD Mission Area: #223 - Close Air Support and Interdiction

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 14294	FY 1982 Estimate 10727	FY 1983 Estimate (103	FY 1984 Estimate TBD	Additional To Completion Continuing	Total Estimated Costs Not Applicable To Be Determined
D302	Corps Support Weapon System	14294	10727	6103	TBD	Continuing	To Be Determined

- B. (9) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: There is a requirement at Corps to interdict and des toy secondechelon enemy forces. CSWS is envisioned as an improved nuclear, conventional, and chemical weapon system to attack targets of importance to the Corps at ranges beyond the capability of cannons and reckets. It will be a replacement for, or a modification of, the existing nuclear and nonnuclear-capable Lance.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: FY 1983 funds will be used for refinement of the CSWS requirement, finalization of a Letter of Agreement or Required Operational Capability, preparation of request for proposal for the validation phase, preparation for ASARC, and early resolution of technology issues as corning various subsystems to reduce development risk. This effort will lead to a validation and demonstration phase 1.75 1984. It should be noted that the evolution of the outyear funding profile and milestone schedule will be based on the output of the Special Task Force.

	Current	Milestone Dates
Major Milestones	Milestone for es	Shown in it 1982 Submission
Begin Assault Breaker Technology		
Demonstration	Apr 11 1978	April 1978
Mission Element Need Statement (MENG)		
Approval	April 101	Moret 1981
Begin Special Task Force	March 1931	March 1991

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Program Element: #6.33.20.A

Title: Corps Support Wespon System (CSWS)

DOD Mission Area: #223 - Close Air Support and Interdiction

(Formerly Assault Breaker)
Budget Activity: #4 - Tactical Programs

Major Hilestones Complete Assuult Breaker
Technology Demonstration Current Milestone Dates
October 1983

Milestone Dates Shown in FY 1982 Submission

Complete Assault Breaker
Technology Demonstration
Army Systems Acquisition Review Council
Defense Systems Acquisition Review
Council

October 1982 October 1981 June 1984 August 1982

TED

September 1982

- (U) Previous Assault Breaker dates were those reflected in the Defense Advanced Research Projects Agency (DARPA) milestone schedule, which has slipped. As the Army has progressed in planning of the CSWS program and because of competing priorities for Army resources, the above adjustments have been made.
- D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	14294	10727	6103	Continuing	Not applicable
Funds (as shown in FY 1982 submission)	14294	11762	TBD	Continuing	Not Applicable

- (U) Competing program priorities and Total Obligational Authority (TOA) limitations precluded funding the FY 1982 total shown in the FY 1982 RDTE request.
- E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

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Program Element: #6.33.20.A

Title: Corps Support Weapon System (CSWS)

For city Assault Breeker)

Budget Activity: #4 - Tactical Programs

DOD Mission Area: #223 - Close Air Support and Interdiction

F. (U) DETAILED BACKGROUND AND DESCRIPTION:

- 1. (U) Description: The Corps Support Mercent System (CWC) will be a 1990s replacement for, or medification of, the existing nuclear and nonnuclear-capable Lance. CCS is envirious has an improved conventional (possibly antiarmor), nuclear and chemical weapon system to attack targets of importance to the Corps at ranges beyond the capability of cannons and rockets. A Department of the Army Special Test Force (STE) are convened in March 1981 to evaluate Corps indirect firepower requirements and conduct exploration, analysis, and refer tion of alternative concept solutions to refine the needs described in the Mission Element Need Statement.
- 2. (0) Mission Element Need Statement (NEUS): There is a need to attack targets at ranges beyond the capability of cannons and rockets with conventional, nuclear, and chemical supports in order to destroy or delay enemy forces. By slowing down the enemy's ability to reinforce and support the central battle, friendly forces can overcome the expected unfavorable force ratio. The Mission Element Need Statement was approved 17 April 1981.
- 3. (U) Assault Breaker: The Assault Breaker technologies are being considered for integration into the CSWS and the Multiple Launch Rocket System's Terminal Guidance Varhead Programs. This Defense Advanced Research Projects Agency (DARPA) technology demonstration uses a long-range Army or Air Force carrier missile with mideourse correction capabilities and an Air Force radar system (Pave Mover) which locates, tracks, classifies, targets, and provides guidance to the carrier missile. The carrier missile dispenses submissiles with infrared terminal homing or nonhoming target-sensing submunitions designed to engage armored targets. The Army Missile Command is the contracting and coordinating agency for DARPA to obtain and test the surface-to-surface carrier missiles, submissiles, and submunitions.
- 4. (U) Programing Summary: The Army plan is to evaluate the integration of Lance nuclear and conventional warhead replacement requirements, chemical warhead considerations, and the cost effective elements of the emerging Assault Breaker technologies into a total CSWS program. The keystone of this evaluation is the output of the Special Task Force (STF) which will provide invaluable insights for the Army, Air Force, and Office of the Secretary of Defense with regard to assessments on the following: target arrays; existing/planned target acquisition systems, C31 and fire control interfaces; type of delivery system(s) required to engage second-echelon targets; types and quantities of warheads needed; minimum/maximum range requirements considering targets, system survivability, and cross-Corps support needs.

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Program Element: #6.33.20.A

DOD Mission Ares: #223 - Close Air Support and Interdiction

Title: Corps Support Weapon System (CSWS)

(Formerly Assault Breaker)

Budget Activity: #4 - Tactical Programs

- G. (U) <u>RELATED ACTIVITIES:</u> Program Element (PE) 6.27.02.E, Defense Advanced Research Projects Agency (DARPA) Tactical Technology; Missile Technology (PE 6.23.03.A); PE 6.27.11.E, Army Missile Command's Terminally Guided Submissile (TGSM) and SKEET target-sensing submunition work; the Air Force's Wide Area Antiarmor Munitions (WAAM) Program, Air Force Activity PE 6.46.13.F; warhead technology associated with the Lance Missile System; Multiple Launch Rocket System (MLRS), Terminal Guidance Warhead (TGW), PE 6.33.03.A, project D216; target acquisition/surveillance technology associated with the Army's Standoff Target Acquisition System; PE 6.36.04, project D135, Nuclear Development Support (for integration of nuclear warhead design); PE 6.36.15, Lethal Chemical Materiel; PE 6.46.10, Lethal Chemical Missile Warhead (chemical PE not funded in FY83 funded FY84); and missile booster technology associated with the Lance and Patriot missile systems. The technology from the Assault Breaker demonstration will be considered for any CSWS antiarmor warhead and the MLRS/TGW. Capabilitier of the above systems will be complementary in nature.
- H. (U) WORK PERFORMED BY: The surface-to-surface portion of the DARPA Assault Breaker technology demonstration is managed by the Army's Missile Command, Huntsville, AL. Pave Mover and the air-to-surface portion of Assault Breaker is managed by Air Force Systems Command's Rome Air Development Center, Griffiss Air Force Station, NY. The following contractors are associated with the surface-to-surface portion of the DARPA Assault Breaker Demonstration: Martin Marietta Corporation, Orlando, FL, for a Patriot missile variant and submissile dispenser; Vought Corporation, Dallas, TX, for a Lance missile variant and submissiles dispenser; General Dynamics (Pomona Division), Pomona, CA, for submissiles; AVCO, Wilmington, MA, for submunitions; Science Applications, Inc., Huntsville, AL, for Assault Breaker coordination. The Chemical Systems Laboratory, Aberdeen, MD, is doing limited warhead work.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 And Prior Accomplishments: Participated in the Assault Breaker technology demonstration. Mission Element Need Statement was approved by the Office of the Secretary of Defense. Established Special Task Force to evaluate Corps indirect firepower requirements, develop a draft Corps Support Weapon System requirements document, and conduct a Cost and Operational Effectiveness Analysis of generic systems.
- 2. (U) FY 1982 Program: Continuation of Special Task Force efforts culminating in a draft requirements document and completion of Cost and Operational Effectiveness Analysis of generic systems. Continuing: participation in Assault Breaker Technology Demonstration; reduction and analysis of Assault Breaker data; nuclear, conventional, and chemical warhead analyses; and analyses of targets, ranges, and effects with selected generic system alternatives.

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Program Element: #6.33.20.A

Title: Corps Support Weapon System (CS S)
(Formerly Assault Breaker)
Budget Activity: #4 - Tactical Programs

DOD Mission Area: #223 - Close Air Support and Interdiction

3. (U) FY 1983 Planned Program: Complete interservice and Department of Defense Secretariat coordination of draft requirements document. Preparation and release for comment to industry of a Request for Proposal based on the coordinated requirements document. Continuation of analyses related to Assault Breaker technology demonstration, nuclear and chemical warheads, alternative conventional warheads, infrared and millimeter wave sensors, ground support equipment, flight simulations, countermeasures, command/control/communications/intelligence interfaces, and early resolution of design/packaging icques.

- 4. (U) FY 1984 Planned Program: Preparation/completion of ASARC and initiation of validation and demonstration phase.
- 5. (U) Program To Completion: To be determined based upon results of the initial system acquisition milestone review held in FY 1984.

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datation .

FY 1983 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.33.23.A
DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: Lightweight AD System
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Complete	Total Estimate Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	3466	14751	To Be Determined	To Be Determined
220	Lightweight Air Defense System	0	0	3466	14751	To Be Determined	To Be Determined

BRIEF DESCRIPTION OF ELPHENT AND MISSION NEED: Organic air defense is required by our airborne, air assault and BRIEF DESCRIPTION OF ELZMENT AND MISSION NEED: Urganic and determine to require anywhere in the world.

light infantry divisions to allow these rapid deployment forces to operate independently anywhere in the world.

Short-range, low-altitude air defense is currently provided by CRAPARRAL, VULCAN, and REDEYE.

REDEYE is being replaced by

STINGER. To replace VULCAN, a Lightweight Air Defense System (LADS) development program will be initiated with FY 1983 RDTE funde.

C. (U) BASIS FOR FY 1983 RDTE REQUEST:

1. (U) Funds are required to complete system requirements definition and complete evaluation of alternative candidate systems.

Program Element: #6.33.23.A

DOD Mission Area: #222 - Ground- Based Antiair and
Tactical Hissile Defense

Title: Lightweight AD System

Budget Activity: \$4 - Tactical Programs

2. Milestones:

	Current	Milestone Dates		
Major Milestones	Milestone Dates	Shown in FY 1982 Submission		
Justification for Major System New Start (JMSNS) Approved	20FY82			
Request for Proposal (RFP) Released	lofy83	-		
ASARC I	1QFY84	~		
DSARC I	1QFY84	-		
Initial Operational Capability (IOC)		•		

- 3. (U) IADS program is a new start; FY 1982 CDS was not submitted.
- D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands): Not Applicable. The Lightweight Air Defense System (LADS) program is a new start; FY 1982 CDS was not prepared.

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Program Element: #6.33.23.A

DOD Mission Area: #222 - Ground- Based Antiair and

Tactical Missile Defense

Title: Lightweight AD System

Budget Activity: #4 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Procurement-Army						
Funds (current						
requirements)	0	0	0	0	To Be Determined	To Be Determined
Funds (shown in						
FY 1982 submission)	-	-	-	-	-	-
Quantities (current						
requirements)	=	-	-	-	To Be Determined	To Be Determined
Quantities (shown in						
FY 1982 submission)	-	-	-	-	-	-

Both gun and missile systems to be evaluated in RDTE phase before Procurement decision/quantity buy is made. This is a new submission; funds/quantities required will be estimated based upon Light Division Air Defense Force Structure Study to be concluded in FY 1982.

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Program Element: #6.33.23.A

DOD Mission Area: #222 - Ground- Based Antisir and
Tactical Missile Defense

Title: Lightweight AD System
Budget Activity: #4 - Tactical Programs

- E. DETAILED BACKGROUND AND DESCRIPTION: The VUICAN Air Defense System (VADS) is

 To provide the improvement in air defense protection required by the light forces expeditiously and affordably, the Army will develop a LADS based upon the mature major components of systems the Army now has or is programed to have in the active inventory. These systems include the manportable STINCER, the Division Air Defense (DIVAD) Gun, and CHAPARRAL, and ROLAND missile system, and possibly 25mm gun derivatives. The Army program will result in an Initial Operational Capability (IOC) for LADS in late

 Emerging critical requirements for LADS are: a day/night system, transportability by all strategic airlift aircraft and by medium-lift helicopters, ground mobility and survivability equal to the light forces to be supported, and commonality of logistic and training support with existing systems.
- G. (U) RELATED ACTIVITIES: STINGER (Program Element 6.43.06A), CHAPARRAL (Program Element 2.37.30A), ROLAND (Program Element 6.43.09A) and DIVAD (Program Element 6.41.31A) are related programs. Currently, there is no duplication of effort within the Army between these programs and the LADS program. Should it be determined that LADS will be derivative of one of these systems, it is anticipated the LADS program would become a project under the control and management of the parent systems Project Hanagement Office.
- H. (U) WORK PERFORMED BY: To be determined; this is a new start program which is not yet under contract.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Justification for Major System New Start (JMSNS) prepared for the Lightweight Air Defense System (LADS). It is anticipated that the JMSNS will be approved as a statement of required need 20FY82.
- 2. (U) FY 1982 Program: To insure full understanding of the unique needs of the light forces, the Army will conduct a Light Divisions Air Defense Force Structure Study in FY 1982. This study will address the relative merits of employing an existing or derivative of an existing or programed system and will evaluate the requirement that IADS be a gun or missile system.
- 3. (U) FY 1983 Planned Program: Light Divisions Air Defense Force Structure Study will be completed. Request for Proposal (RPP) will be issued to industry for concept and hardware proposals. Industry responses will be evaluated.

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Program Element: #6.33.23.A

DOD Mission Area: #222 - Ground- Based Antiair and
Tactical Hissile Defense

Title: Lightweight AD System
Budget Activity: 34 - Tactical Programs

- 4. (U) FY 1984 Planned Program: System to be developed as IADS will be determined. Contractor will initiate design and development. Prototype fabrication will begin.
- 5. Program to Completion: IADS development and acquisition will follow an accelerated program. The development effort, initiated with FY 1984 funds, will be completed with FY 1987 funds. To support an IOC in late a long-lead procurement decision must be reached in late FY 1985 or early FY 1986. This is not considered to be high risk, as the basis for IADS will be the mature components of an already existing system.

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.04.A

DOD Mission Area: #241 - Battlefield Theater

Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 1891	FY 1982 Estimate 3568	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
D135	Nuclear Weapon Development Support	493	727	845	877	Continuing	Not Applicable
D148	Atomic Demo'ition Munition (ADM) Firing and Control System	0	405			TBD	TBD
D153	Nuclear Effects Support Team (NEST)	724	959	1117	1276	Continuing	Not Applicable
D443	Nuclear Projectiles Advanced Development	374	713			Continuing	Not Applicable
D483	Radiac Equipment	300	764	1498	2758	Continuing	Not Applicable

*Prototype hardware is not procured in all these projects. For those where prototype hardware would be procured, program definition has not progressed to the point where quantities have been defined.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army must maintain a viable capability to fight on the integrated nuclear battlefield. It is thus absolutely essential for the Army to have modern, effective, and safe nuclear

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Program Element: #6.36.04.A

DOD Mission Area: #241 - Battlefield Theater
Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: #4 - Tactical Programs

weapon systems. The Army must also be able to effectively defend against the effects of the enemy's nuclear weapons. Effective defense in a nuclear environment requires modern burst and radiation detection and measurement devices. Finally, whether in an offensive or defensive posture, critical fielded systems must be survivable in a nuclear environment. The projects in this program comprise the Army's nuclear system Advanced Development efforts and also fund the management and engineering support structure required to interface with the Department of Energy and other weapon system developers.

- (U) D135 Nuclear Weapon Development Support. The Project manager for Nuclear Munitions has the responsibility to provide the nuclear engineering interface for Project Managers of systems having a nuclear capability with the Department of Energy, Army laboratories, and the Department of Army Staff. He must also provide support to development efforts that pertain to generic nuclear programs (as opposed to a specific weapon system), and must fulfill life cycle management responsibilities for stockpiled Army weapons.
- (U) D148 Atomic Demolition Munition (ADM) Firing and Control System. ADM provide a unique capability to meet selected barrier plan requirements and to deny designated facilities to an advancing enemy. Current ADM's represent the technology of the early 1960's. The Army is currently exploring alternatives to improve fielded ADM's, and will decide in FY82 whether potential improvements would be cost effective.
- (U) D443 Nuclear Projectile Advanced Development. This project supports the development of improved safing, arming, and fuzing components urgently required to meet modern nuclear safety standards. The top-priority task is to develop power sources which dissipate electrical energy in a safe and predictable way when abnormal environments are experienced. Current generation nuclear weapons use battery power sources and shunts-to-ground.
- (U) D483 Radiac Equipment Advanced Development. There is an urgent requirement to develop technology to upgrade Army burst and radiation detection equipment which is old and bulky, has limited response capability, and cannot be efficiently employed from ground vehicles or aircraft. Successful development efforts will be transmitted to the Army's continuing engineering development line.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: The Project Manager for Nuclear Munitions will continue nonsystem-related RDTE to fulfill Army-wide requirements as directed. Support of Joint DOE-DOD Studies for the Low-Altitude Air Defense System and Corps Support Weapon System will continue. Support for various project managers in the area of nuclear survivability will

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Program Element: #6.36.04.A

DOD Mission Area: #241 - Battlefield Theater
Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: #4 - Tactical Programs

be continued as part of the Army Nuclear Survivability Program. Efforts will be expanded to develop survivable common-use items and government-furnished equipment. Development of nuclear warning and defense equipment will continue. Total development costs are moderate- to high-risk assessments because of uncertainties in the technologies involved.

	Current	Milestone Dates
Hajor Milestones	Milestone Dates	Shown in FY 1982 Submission
Atomic Demolition Hunition (ADH)*		
Firing and Control System		
Feasibility Assessment Completed	FY81	FY81
Initiation of Advanced Development	FY84	FY82
Radiac Equipment Advanced Development	•	
Ground EMP and Optical Nuclear Detec	tion System (GEONDS)**	•
Advanced Development Initiated	FY82	Not Shown
GEONDS Advanced		
Development Completed	FY86	Not Shown
•		

*The ADM Improvement Program has been delayed to provide time for the Army to reevaluate the role of nuclear munitions in barrier planning.
**Baseline program is to transfer to production directly from advanced development.

D. COMPARISON WITH FY 1962 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements) Funds (as shown in FY 1982	1891	3568		Continuing	Not Applicable
submission)	1715	3571		Continuing	Not Applicable

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Program Element: #6.36.04.A

DOD Mission Ares: #241 - Battlefield Theater
Nuclear Warfare

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Title: Nuclear Munitions and Radiaca
Budget Activity: 94 - Tactical Programs

- (U) The \$176 thousand increase in FY 1981 occurred because: Accelerated nuclear projectile advanced development efforts were required to develop a rotating band to titanium body bonding technique for the new 155mm nuclear projectile (+\$177); funds previously withheld by the Office of the Secretary of Defense were released to the radiac advanced development (AD) line to support completion of the vehicular radiac (+\$300k); business sense changes were required to account for inflation adjustments, revised pay indices, and small dollar reprograming to higher priority projects (-\$301).
- (U) The \$3 thousand decrease in FY 1982 is a result of the application of revised inflation indices.
- (U) The \$3076 decrease in FY 1983 reflects the delay of the ADM modernization pending cost effectiveness analysis (-\$521), the deferral of nuclear projectile AD to outyears because of higher priority near item requirements (-\$1947); reduced radiac AD effort because of higher priority requirements (-\$585) and minor inflation adjustments (-\$23).
- E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands): Not Applicable.

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Program Element: #6.36.04.A

DOD Mission Area: #241 - Battlefield Theater
Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: Emphasis on the advanced development (AD) of nuclear artillery projectiles is to develop prototype hardware for new warhead proposals which reduce collateral damage, increase range and accuracy, and improve safety, security, and command and control. The modernization of already stockpiled weapons is directed toward improving nuclear safety and security (D148). The family of radiological and burst detection, measurement, and alarm devices will be improved through application of technology developed in this program. The objective is to spply such improvements as "large-scale integration" technology to electronics in radiac equipment and to apply automatic data processing techniques to burst detection and radiological survey systems. Potential cost savings in applying this technology are substantial (D483). R&D support for nonsystem-related functions such as overall command, control, and security of the nuclear stockpile will be provided by the Project Manager (PM) for Nuclear Munitions (D135). A Nuclear Effects Support Team will provide technical support to system PM's in the area of nuclear survivability and hardening. This effort is easential because the survivability program is embryonic and requires expert liaison to facilitate technology transfer to the material developer community. This is a key element of the Army Nuclear Survivability Program (D153).
- G. (U) RELATED ACTIVITIES: This program complements and is closely coordinated with Department of Energy (DOE) advanced development efforts. The outputs of exploratory development efforts in Program Element 6.26.03.A, Large Caliber and Nuclear Technology, are utilized. Tri-Service radiological detection programs are coordinated and integrated. Items in this program element progress to Engineering Development in related Program Elements 6.46.03.A, Nuclear Munitions, and 6.47.06.A, Radiological Defense Equipment.
- H. (U) WORK PERFORMED BY: US Army Armament Research and Development Command, Dover, NJ; Harry Diamond Laboratories, Adelphi, MD; US Army Materials and Mechanics Research Center, Watertown, MA; and US Army Electronics Research and Development Command, Fort Monmouth, NJ. Principal contractors include Bendix Corporation, South Bend, IN, and Sandia Laboratories, Albuquerque, NM.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: The Project Manager for nuclear munitions continued to provide assistance in identifying improvements required in the nuclear weapon stockpile, and managed the nuclear warhead development effort for Pershing 11 and the 8-inch and 155mm nuclear projectiles. Development of various artillery projectiles, atomic demolition munitions and surface-to-surface missile adaption kits was completed in the 1970's. Monitoring these stockpile weapons

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Program Element: #6.36.04.A

DOD Mission Area: #241 - Battlefield Theater
Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: #4 - Tactical Programs

continues within appropriate engineering sections of the Project Manager for Nuclear Munitions. The Nuclear Effects Support Team provided substantial support to system project managers in the area of Nuclear Survivability. Digital Radiac advanced development was completed in FY81.

- 2. (U) FY 1982 Program: Analysis in support of the Corps Support Weapons System (CSWS) Warhead and the Low-Altitude Air Defense System (LOADS) will continue. Atomic Demolition Munition modernization alternatives will be selected. Support to Project Managers will be continued in the area of nuclear survivability. Advanced development of the Ground EMP and Optical Nuclear Detection System (GEONDS) will be initiated. This system will automatically detect the burst, provide the location, predict the yield, determine if the burst was in the air or on the ground (important for fallout prediction), and automatically transmit all data to corps headquarters.
- 3. (U) FY 1983 Planned Program: The Project Manager for Nuclear Munitions will continue RDTE support for the LOADS and CSWS weapon systems. Advanced development of the GEONDS will continue. The Nuclear Effects Support Team will continue to support project Lanagers in the area of nuclear survivability.
- 4. (U) FY 1984 Planned Program: The Project Manager for Nuclear Munitions will continue RDTE support for the Low-Altitude Air Defense System and the Corps Support Weapon System nuclear warhead development programs. Development will be initiated o enhanced safety devices for nuclear weapons. The Nuclear Effects Support Team will continue to support Project Manage in the area of survivability. Nuclear weapons extended range projectile and arming and firing system improvements will be continued. GEONDS advanced development will continue.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONCRESSIONAL DESCRIPTIVE SUPERARY

Program Riement: # 6.36.12.A

DOD Mission Area: #211 - Direct Fire Combat

Title: RATTLER
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	Fy 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	16006	0	17900	31269	To Be Determined	To Be Determined
D311	quantities Imaaws	16006	0	17900	31269	To Be Determined	To Be Determined

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Infantry must have the capability to combat numerically superior armored forces. This need has been met by the TOW, DRAGON, and LAW, respectively long-, medium-, and short-range weapons systems. The TOW allows the Infantry to kill tanks at long range, and with medium- and short-range weapons, to still afford the numbers of weapons necessary to deal with the high intensity of close combat with superior forces. The medium manportable weapon provides a significant tank-killing capability for light forces. The DRAGON system is deficient in . The RATTLER, formerly the Infantry Manportable Antistmor/Assault Weapon System (IMAAWS), will replace the DRAGON system in the late 1980's. The RATTLER will be a manportable weapon designed to correct the DRAGON system deficiencies and defeat armored vehicles and engage other hardpoint targets, and as such, will play a key role in the light Infantry and Rapid Deployment Force (RDF) contingency missions.

C. (U) BASIS FOR FY 1983 RDTE REQUEST: The FY83 funds are needed to support the selection for development of the most promising of the several diverse solutions to the system technical requirements. Some component critical technologies will also be further developed to reduce subsequent engineering development cost and risk.

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Program Element: # 6.36.12.A

DOD Mission Area: #211 - Direct Fire Combat

Title: RATTLER

Budget Activity: #4 - Tactical Programs

Hajor Hilestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Army Decision	4th Qtr 80	4th Otr 80
Second Army Decision Review	4th Qtr 83	4th Qtr 81
Army/DOD Decision Review	lst Qtr 84	lat Qtr 84

The 4th quarter 1980 decision was subsequently reviewed in October 1980. This review determined that the concepts selected were insufficiently suited to the light infantry need and that the current effort should be terminated pending further refinement of the requirement description. A study to be completed in April 1982 has been established to resolve needed system physical/performance characteristics issues. The Second Army Decision Review has been postponed.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	16006	0	17900	To Be Determined	To Be Determined
submission)	19506	23106	To Be Determined	To Be Determined	451466

The decrease in FY81 is attributable to the application of general Congression1 reductions. The "zeroing" of FY82 funding was caused by unresolved requirement issues precluding formulation of specific weapons concepts. Since program cost estimates were made prior to selecting the weapon concept, they involve some approximations. The estimates are based on parametric and technical analyses of the various possible concepts and judgment as to the most likely course of events. Funding requirements are Army estimates as no contracts were in force when made. The Army is reasonably confident that the full development can be accomplished with these resources; however, the program plan is recognized as having high schedule/cost risk. Adjustments to reduce overall program life-cycle costs could make increasing resources for development a desirable option.

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

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Program Element: # 6.36.12.A DOD Mission Area: #211 - Direct Fire Combat Title: RATTLER
Budget Activity: #4 - Tactical Programs

- DETAILED BACKGROUND AND DESCRIPTION: Analyses of the current and projected threat indicate that the current infantry antiarmor systems (basic TOW and DRAGON) are

 Due to this threat assessment (in agreement with the assessments of the United Kingdom, France, and the Federal Republic of Germany), and the major shortcomings in the current infantry antiarmor weapons, the Army has undertaken efforts to provide our infantry with adequate antiarmor firepower to combat the increasing quality of the numerically superior Soviet threat. These efforts include accelerating improvements to the current long-range antiarmor missile (see TOW Program Element 2.37.24.A) and developing a medium manportable system to begin replacing the current DRAGON system in the late 1980's. System concepts will be developed by industry in responding to a performance-oriented Request for Proposal in late FY82 which may include the Defense Advanced Research Projects Agency (DARPA) high-risk technology concept for a focal plane array imaging infrared terminal homing system. In FY83, the most promising concept will be selected for engineering development to a production decision in FY86. The RATTLER will provide a manportable precision weapon to defeat armored vehicles and engage other point targets with high system lethality. As such, this weapon will greatly increase the antiarmor firepower of the light infantry and the Rapid Deployment Forces (RDF) and provide the capability to engage numerically superior mechanized forces for potential worldwide contingency missions. This weapon will complement the heavy (250 pounds), long-range (3750 meters) improved TOW system and will complicate the threat countermeasures problem through the use of a different guidance mode and possibly different lethality technique (e.g., top attack).
- G. (U) RELATED ACTIVITIES: TOW Missile System (PE 2.37.24.A), Advanced Munitiions Project (PE 6.33.13.A), Defense Advanced Research Projects Agency (DARPA) Technology Investigations and Missile Technology (PE 6.23.03.A). The DARPA and Army efforts are being closely coordinated to preclude duplication of effort. The Army project office is also the contracting agent for the DARPA program.
- H. (U) WORK PERFORMED BY: US Army Missile Command (MICOM), Redstone Arsensl, AL.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Evaluated the results of exploratory development tests of acquisition/guidance hardware, warheads, and propellants. Evaluated results of smoke and countermeasures tests and reports describing the operation of a number of acquisition/guidance techniques. Conducted a concept study and evaluated eight system proposals. Initiated discussion with NATO allies for a potential cooperative development effort, and reached a tentative agreement that the European trilateral group (UK, FR, GE) would assume development responsibilities for a

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Program Element: # 6.36.12.A
DOD Mission Area: #211 - Direct Fire Combat

Title: RATTLER
Budget Activity: #4 - Tactical Programs

vehicle-mounted system (TOW and HOT replacement), while the US would develop a manportable system (DRAGON and MIIAN replacement). Evaluated six IMAAWS proposals from industry and tentatively selected and contracted for the demonstration of Smart, Target-Activated, Fire-and-Forget (STAFF), and Laser Beamrider (LBR) concepts. Subsequent information cast doubt on the systems suitability (physical/performance characteristics) of the proposed demonstration hardware. The contracts were then canceled pending the results of a systems suitability study. The study, completed in April 1981, was inconclusive, thus causing the establishment of a subsequent study due for completion in April 1982 to resolve remaining issues.

- 2. (U) FY 1982 Program: Honitor technology developments and complete requirements studies/analyses. Continue discussions with North Atlantic Treaty Organization (NATO) allies relative to exchange of technical information and parallel cooperative development of complementary antitank guided weapon systems.
- 3. (U) FY 1983 Planned Program: Define system concepts and prepare to begin development in FY83. Continue supporting the Four Power antiarmor Family of Weapons cooperative development program.
 - 4. (U) FY 1984 Planned Program: Continue development begun in FY83 for fielding in the late 1980's.
- 5. (U) Program to Completion: Complete development and begin production in the late 1980's for US and other NATO forces.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.36.15.A Title: Lethal Chemical Hunitions Concepts
DDD Mission Area: #275 - Retaliatory Chemical Warfare Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 870	FY 1982 Estimate 8157	FY 1983 Estimate 13733	FY 1984 Estimate 20377	Additional to Completion Continuing	Total Estimated Cost Not Applicable	
DE76	Lethal Chemical Materiel	870	8157	13733	20377	Continuing	Not Applicable	

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Union of Soviet Socialist Republics (USSR) has developed and continues to maintain a formidable offensive chemical warfare capability which presents a threat to survival of US and NATO forces. In contrast, the US has not produced any new chemical weapons since 1969. Consequently the stockpile is deteriorating and the number of usable munitions is decreasing. US policy requires a chemical weapons development program which will provide a credible deterrent/retaliatory capability. This project supports that need by providing for the transition of technology concepts into advanced development material. Additionally, the Department of Defense (DOD) has designated the Army Executive Agent for development of all Services' chemical warfare requirements. There is no other DOD program which satisfies these needs.
- C. (U) BASIS FOR FY 1963 RDTE REQUEST: Advanced development will be continued on a binary lethal agent warhead for the Multiple Launch Rocket System (MLRS). A chemical warhead for the hLRS will significantly improve the effectiveness of the US deterrent/retaliatory capability in terms of range, rate of fire, and area coverage. Advanced development will be continued on a chemical warhead for the 8-Inch Binary Intermediate Volatility Agent (IVA) Projectile. The IVA significantly increases both inhalation and percutaneous effects over the current lethal persistent nerve agents.

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Program Element: \$ 6.36.15.A Title: Lethal Chemical Munitions Concepts

DOD Mission Area: \$275 - Retaliatory Chemical Warfare Budget Activity: \$4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Initiate Engineering Development (ED) on 155mm Binary Intermediate Volatility Agent (IVA) Projectile	1QFY82	FY81
Resume Advanced Development (AD) on NIRS Lethal Binary Warhead	4QFY81	4QFY81
Complete AD on MLRS Lethel Binary Warhead	4QFY85	4QFY85
Initiate AD on 8-inch Binary IVA Projectile	4QFY81	4QFY84
Complete AD on 8-inch Binary IVA Projectile	4QFY83	4QFY67
Initiate AD on Corps Support Weapon System	1QFY84	1QFY82
Complete AD on Corps Support Weapon System	4QFY86	4QFY83

The difference in FY 1982 and FY 1983 milestone for initiating Engineering Development (ED) on the 155mm binary Intermediate Volatility Agent (IVA) projectile resulted from a minor program schedule adjustment. The difference in FY 1982 and FY 1983 milestones for both initiation and completion of advanced development (AD) for the 8-inch binary IVA projectile is due to a decision to accelerate the development schedule and utilize technology gained in the 8-inch binary VX-2 developmental effort. The difference in FY 1982 and FY 1983 milestones for the Corps Support Weapons System (CSWS) binary IVA warhead is a result of a deferment in the overall CSWS program.

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Program Element: \$ 6.36.15.A

DOD Hission Area: \$275 - Retalistory Chemical Warfare

Title: Lethal Chemical Hunitions Concepts
Budget Activity: \$4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
ADTE Funds (current requirements) Funds (as shown in FY 1982	870	8157	13733	Continuing	Not Applicable
submission)	1820	8182	9444	Continuing	Not Applicable

Reduction of \$950 thousand in the FY 1981 funding level is a result of reprograming to higher priority Army requirements. The decrease of \$25 thousand in FY 1982 is a result of the amended budget request and the application of revised inflation indices. The increase of \$4289 in the FY 1983 funding level is a result of a realignment of priorities in order to accelerate fielding on the MLRS and 8-inch binary IVA munitions.

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

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Program Element: # 6.36.15.A Title: Lethal Chemical Munitions Concepts

DDD Mission Area: #275 - Retaliatory Chemical Warfare Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to conduct Advanced Development on binary lethal chemical agent munitions which have progressed from Exploratory Development and exhibit potential for casualty production through either the respiratory tract and/or penetration of environmental and protective clothing. Small-scale pilot units are designed and installed to obtain process engineering data for application to future production facilities. Chemical agent munitions concepts that employ the binary principle are evaluated. The program is essential to the development of a credible deterrent/retailatory chemical warfare capability required by US national security policy and to counter the formidable CW threat posed by the Soviet Union.
- G. (U) RELATED ACTIVITIES: As directed by Department of Defense (DOD) Directive 5160.5, the Army has executive agent responsibility for the development of all lethal chemical agents and common use munitions. Therefore, no comparable work is done by the other Services on lethal chemical munitions development and agent processes. Each of the other Services sponsors engineering development on lethal chemical agent weapons unique to its requirements. Information is exchanged and the efforts are coordinated through exchange of cechnical documents, liaison officers, and by joint technical coordinating groups. Exploratory work leading to this Advanced Development effort is conducted under program element (PE) 6.26.22.A, Chemical Hunitions and Chemical Combat Support. Items successfully completing Advanced Development are transferred to Engineering Development under PE 6.46.10.A, Lethal Chemical Munitions.
- H. (U) WORK PERFORMED BY: US Army Chemical Systems Laboratory, Edgewood, MD, which is the in-house Army developer for lethal chemical agent munitions; the US Army Test and Evaluation Command (TECOM), Aberdeen Proving Ground, MD; and Dugway Proving Ground, Dugway, UT. The Chemical Systems Laboratory performs all toxic chemical agent development work for the Department of Defense. Vought Corporation, Dallas, TX, the MLRS developer, has a contract to investigate chemical warhead interface problems.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Numerous concepts for weaponization of lethal chemical agents have been investigated and developed into prototype systems under this program. Since FY 1970, advanced development has been completed on a 155mm binary nonpersistent lethal chemical projectile and a binary 8-inch persistent lethal agent projectile; prototypes of chemical submunitions and chemical warheads for rockets and missiles have been evaluated. Design criteria and fessibility studies for development of a chemical warhead for the Multiple Launch Rocket System (MLRS) were the primary efforts for FY 1980. In FY 1981, advanced development (AD) of the binary warhead for the MLRS was resumed and AD initiated on the 8-inch 1VA binary projectile.

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Program Element: # 6.36.15.A Title: Lethal Chemical Nunitions Concepts
DDD Mission Area: #275 - Retaliatory Chemical Warfare Budget Activity: #4 - Tactical Programs

- 2. (U) FY 1982 Program: Advanced Development (AD) on the binary warhead for the MLRS and the 8-inch binary 1VA projectile will continue. The Concept Demonstration tests will be completed and evaluated. Initial AD design and Development Test 1/Operational Test 1 (DT I/OT I) plans will be prepared. Fabrication of munitions and associated material required for the tests will be initiated.
- 3. (U) FY 1983 Planned Program: The agent fill (IVA versus more persistent lethal nerve agent) for the MLRS will be selected, and the validation phase of testing will be initiated. Hunition fabrication will be completed, and DT I/OT I will be conducted for the 8-inch IVA projectile.
- 4. (U) FY 1984 Planned Program: Advanced development (AD) will be continued on the HLRS and initiated on the binary warhead for the Corps Support Weapons System (CSW5).
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.19.A

DOD Mission Area: 213 - Land Combat Engineer Support

Title: Landmine/Barrier Systems
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	2830	6050	4595	19932	Continuing	Not Applicable Not Applicable
D005	Landwine Systems	1435	4163	4319	6993	Continuing	Not Applicable
D606	Countermine and Barrier Systems	1395	1887	276	12939	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objectives of this program are to improve Army countermine capabilities and provide for advanced development of new mine systems. Countermine equipment prototypes which aid in the maintenance of battlefield mobility and techniques to reduce the Logistic burden normally associated with barrier systems are being investigated. Improved field fortification techniques, combat shelters, are being devised and evaluated to improve battlefield survivability of friendly forces. Soviet and Warsaw Pact doctrine advocates the large-scale use of landmines in both offensive and defensive operations. In support of this doctrine, the Soviets have developed mechanized devices which rapidly lay minefields having a variety of complex mine fuzes. Mutually supporting countermine devices and techniques are required to meet this threat. New mine systems are being developed and tested under this program element by prototyping advanced development components, sensors, fuzes, logic networks, and power sources into complete mine systems. Mines provide a formidable obstacles to the massive tank threat posed by the Warsaw Pact and are required to fortify natural obstacles such as defiles, woods, rivers and builtup areas in order to delay, canalize, and interdict attacking forces and enhance the performance of direct and indirect fire weapons.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Complete advanced development of a portable mine neutralization system (POMINS) to counter antipersonnel minefields and barbed wire and transfer vehicle magnetic signature duplicator (VEMASID) to counter magnetic influence fuzes to Engineering Development. Initiate advanced development of the universal mine-dispensing system (VOLCANO), an Improved Conventional Mine (ICOM), and a Pursuit Deterrent Munition for Special Forces.

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Program Element: #6.36.19.A

DOD Mission Area: 213 - Land Combat Engineer Support

Title: Landmine/Bartier Systems
Budget Activity: \$4 - Tactical Programs

D. (U) COMPARISON WITH FY82 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	2830	6050	4595	Continuing	Not Applicable
submission)	4425	6066	8728	Continuing	Not Applicable

Program decrease in FY81 reflects restructuring within the program element and reprograming to higher priority Army mine programs. FY82 decrease is the result of the application of revised indices for inflation and civilian pay increase. FY83 decrease reflects a reprograming to higher priority requirements.

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

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Program Element: #6.36.19.A

DOD Mission Ares: 213 - Land Combat Engineer Support

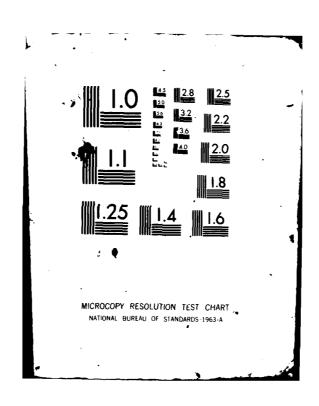
Title: Landmine/Barrier Systems

Budget Activity: 54 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program element provides for prototype testing of countermine concepts developed in Program Elements 6.27.33.A, Mobility Equipment Technology, and 6.36.06.A, Landmine Warfare Barrier Developments. The goal is to provide the Army with a family of mutually supporting countermine devices and techniques to meet the identified threat. The challenge of mine detection and neutralization has proven to be highly complex in the pursuit of maintaining the momentum of the attack. Detection must be accomplished rapidly and remotely, if possible. Neutralization must be highly reliable and, to the extent possible, from a standoff position. Field fortification efforts are concentrating on a family of improved Combat Shelters consisting of metal frames with fabric covers to support earth protection. The Army has also been in the process of developing and fielding a family of scatterable mines (FASCAM) for some years. These small, highly lethal mines are configured for delivery by various means including helicopters, artillery, ground dispensers, and manportable modular packs. Development of new mines begins by addressing the components which make up the mine, i.e; lethal mechanisms, fuze, logic network, power sources, and potential configuration. Once these components can be configured into a prototype, the mine is then treated as a system and is transferred from Program Element 6.36.06.A, Landwine Warfare Development, to this program element. Three mines are currently included in this category: a Pursuit Deterrent Munition for the Special Porces (this system will be a special adaptation of the Area Denial Artillery Munition antipersonnel mine), an improved conventional mine for hand or mechanical emplacement which takes advantage of the features associated with the scatterable mines, and a universal mine-dispensing system which will provide a mine launcher which can be used on a variety of vehicles.
- G. (U) <u>RELATED ACTIVITIES</u>: Component work and exploratory development for this program are conducted in <u>Program Elements</u> 6.27.33.A, <u>Mobility Equipment</u> Technology, and 6.36.06.A, Landmine Warfare/Barrier Development. Engineering development efforts which result from this program are accomplished in <u>Program Elements</u> 6.46.12.A, Countermine & Barriers, and 6.46.19.A, Landmine Warfare. Mine and countermine efforts are closely coordinated to incorporate counter-countermeasures as applicable. Development information on mines is coordinated and exchanged between the services by the Tri-Service Joint Technical Coordinating Group for Bombs, Mines, and Clusters. The Department of Defense Armaments Munitions Requirements and Development Committee monitors the scatterable mine program with a view to avoiding service duplication.
- H. (U) WORK PERFORMED BY: The US Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA, is assigned countermine and barrier development responsibility. Armament Systems Directorate, US Army Armament Research and Development Command (ARRADCOM), Dover, NJ, is assigned responsibility for landmine systems.

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Program Element: #6.34.19.A DOD Mission Area: 213 - Land Combat Engineer Support Title: Landmine/Barrier Systems

Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accompliahments: Advanced development (AD) was completed on the Surface-Launched Unit, Fuel-Air Explosive (SLUFAE) mine neutralization system, the vehicle-mounted road mine detector, the mine-clearing roller, and the mine-clearing plow. Initiated AD on portable mine neutralization systems (POMINS), a vehicle magnet : signature duplicator (VEMASID) to counter magnetic influence fuzes, and the horizontal action off-route antivehicular/a titank mine.
- 2. (U) FY 1982 Program: Continue Advanced Development (AD) on POMINS, VEMASID, and complete (AD) on a horizontal action off-route antitank/antivehicular mine.
- 3. (U) FY 1983 Planned Program: Complete Advanced Development (AD) and transfer POMINS and VEMASID to Engineering Development and continue AD on improved combat shelters; initiate AD on the universal mine dispenser system, the Pursuit Deterrent Munition, the Improved Conventional Mine (ICOMS) and develop combat shelters for other than antitank weapons.
- 4. (U) FY 1984 Planned Program: Continue Advanced Development (AD) on improved combat shelters, the universal mine dispenser system and the Pursuit Deterrent Munition. Initiate AD on an Improved Conventional Mine System (ICOMS) and a dedicated counterobatacle vehicle, an Airborne Minefield Detection System (AMIDS), and a Vehicular Off-Road Mine Detector (VORMID).
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.27.A DOD Mission Area: #275 - Retaliatory Chemical Warfare

Title: Combat Support Munitions
Budget Activity: #4 - Tactical Programs

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

Project Number	<u>Title</u>	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	3384	3149	2700	13700	Continuing	Not Applicable Not Applicable
DE 82	Smoke Munitions and Mater al	3384	3149	2700	13700	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program is required for advanced development, investigation, and evaluation of smoke material and munitions. New and significantly improved smoke/obscurant systems are required to protect United States (US) forces from advanced Soviet electro-optical devices which operate across the electromagnetic spectrum (from visible to the radar region). The currently fielded US Army smoke systems wer developed before and during World War II and are not capable of rapidly providing the broadband screening for the required length of time for our armored vehicles, critical installations, assembling forces, and logistical complexes to survive on the modern battlefield.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Funds are needed to continue Advanced Development (AD) of prototype large-area screening systems. Funds are also needed to continue AD of promising combat vehicle rapid smoke systems that will screen/obscure in the far infrared portion of the electromagnetic spectrum. These efforts are necessary to provide for armored vehicle survivability and for timely and effective large force, installation, and logistical complex screening on a modern battlefield.

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Program Element: #6.36.27.A

DOD Mission Area: #275 - Retaliatory Chemical Warfare

Title: Combat Support Munitions
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	<u>PY 1983</u>	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	3384	3149	2700	Continuing	Not Applicable
runds (as smoon in Fi 1902 submission)	2311	6157	4029	Continuing	Not Applicable

The PY 1981 increase of \$1073 thousand was required to accelerate development of a combat vehicle smoke grenade capable of obscuring the far infrared portion of the electromagnetic spectrum. The FY 1982 decrease of \$3008 thousand is the result of a Congressional decision. The FY 1983 reduction of \$1329 thousand is the result of program realignment.

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

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Program Element: #6.36.27.A

DOD Mission Area: #275 - Retaliatory Chemical Warfare

Title: Combat Support Munitions
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to conduct Advanced Development (AD) of new and improved smoke munitions and material. Current emphasis is on the Advanced Development of improved smoke systems that screen in the infrared as well as the visible spectrum, and on large-srea screening systems. Developmental systems will increase survivability of armored vehicles, weapons, command and control systems, and personnel.
- G. (U) RELATED ACTIVITIES: This program is supported by Program Element: 6.26.22.A, Chemical Munitions and Chemical Combat Support; 6.46.01.A, Infantry Support Weapons; and 6.46.09.A, Combat Support Systems. In order to meet other Service needs and to prevent unnecessary duplication of effort, liaison personnel from each Service monitor the developing agency's programs, and a Joint Services Smoke Steering Committee meets regularly.
- H. (U) WORK PERFORMED BY: In-house work is conducted by United States (US) Army Armaments Research and Development Command, Dover, NJ. Contractors are Battelle Corporation, Columbus, OH; AAI Corporation, Cockeysville, MD; and others to be determined.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Under Program Element 6.26.22.A, Chemical Munitions and Chemical Combat Support, a concept of screening materials and munitions was developed and demonstrated. As a result, interest was generated, and the smoke/serosol program received renewed emphasis. The concept of embedding wicks in white and red phosphorus significantly increased the burning characteristics and smoke generation capability of the 155mm smoke projectiles. Advanced Development (AD) on the XM825 155mm smoke projectile was completed in FY 1978. The technology gained has been utilized in the development of a. improved 81mm mortar smoke cartridge. In FY 1979 AD was initiated on a manportable large-area screening smoke system (LASS) and an infrared defeating smoke grenade to be utilized for large-area screening and protection of armored vehicles respectively. During FY 1980, competitive testing of the "Ballistic Match" versus "Maximum Screening" prototype of the 81mm mortar cartridge was completed. The "Maximum Screening" prototype was selected for continued AD. Procurement of hardware for Development Test I/Operational Test (DT I/OT I) was initiated. Prototype design was selected and fabrication initiated on DT I/OT I hardware for the manportable smoke/obscurants generating system. AD continued on an infrared (IR) defeating grenade. In FY 1981, DT I/OT I were completed and the decision made to redirect development effort to a more powerful and efficient Large-Area Screening Smoke System (LASS) that would be capable of dispensing material to obscure both the visible and infrared regions of the electromagnetic spectrum. In addition, the Independent Evaluation Plan/Test Design Plan (IEP/TDP) was completed so the infrared (IR)-defeating grenade could proceed to DT I/OT I.

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Program Element: #6.36.27.A
DOD Hission Area: #275 - Retaliatory Chemical Warfare

Title: Combat Support Munitions
Budget Activity: #4 - Tactical Programs

- 2. (U) FY 1982 Program: Advanced Development (AD) will be completed on the IR-defeating grenade and will continue on the Large Area Smoke/Obscurants Generating System (LASS).
- 3. (U) FY 1983 Planned Program: Advanced Development (AD) will continue on the Large Area Smoke/Obscurants Generating System (LASS) with a special in-process review to be held 1QFY83 to assess program progress.
- 4. (U) FY 1984 Planned Program: The Large Area Smoke/Obscurants Generating System (LASS) will complete AD and transfer into engineering development (ED). AD will be initiated on the IR-defeating smokepot, IR-defeating VEESS, training smokes, infrared-defeating artillery and mortar projectiles, and special-purpose smoke/obscurant systems that are scenario dependent.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.36.28.A

DOD Mission Ares: #212 - Indirect Fire Support

Title: Field Artillery Ammunition Development
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	11905	24647	23951	32623	Continuing	Not Applicable
D007 D276	Field Artillery Ammunition SADARM	4107 7798	6265 18382	4913 19038	14947 17676	Continuing Continuing	Not Applicable Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports the design and development of more effective propelling charges, munitions, and fuzing for field artillery systems to offset the advantages in range and numbers currently enjoyed by Warsaw Pact artillery and armor forces. A principal objective is to develop improved approaches to cannon propelling charge and projectile design in the gum propulsion technology program that will provide significantly increased range capability and enable US artillery to compete with and survive against Warsaw Pact forces. Also included is the Advanced Development Program for the Sense and Destroy Armor Artillery Munition (SADARM). The SADARM will provide a fire-and-forget antiarmor capability in the indirect fire role which significantly increases the lethality of field artillery against an armored threat. The fuze efforts encompassed by the program are focused on increasing the operational effectiveness of present munitions. Wireless data transmission techniques are being developed to automatically set fuzes, thereby improving response and reducing human error. A major objective is the development of a new electronic fuze to meet the requirements of advanced weapons systems. Efforts are continuing to reduce annual training costs by developing low-cost training projectiles for the 60mm and 81mm mortar.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: To provide for: continued development of inexpensive indirect fire mortar training projectiles; continue advanced development of Sense and Destroy Armor Munition (SADARM) and continue 155mm modular stick propelling charge; continue the gun propulsion technology program initiated in FY 1978; and extended range projectile work initiated in F'81.

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Program Element: # 6.36.28.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Field Artillery Ammunition Development
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	11905	24647	23951	Continuing	Not Applicable
submission)	12275	24722	28777	Continuing	Not Applicable

The FY81 decrease is due to reprograming to higher priority Army requirements. The FY82 decrease is due to the application of revised inflation and civilian pay pricing indices. The FY83 decrease is the result of a rescheduling of tasks within available resources.

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

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Program Element: # 6.36.28.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Field Artillery Ammunition Development
Budget Activity: 44 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program supports two projects in munitions advanced development. Project DOO7, Field Artillery Ammunition, provides for: Development of low-cost inert metal mortar training projectiles to provide realistic training and significant avoidance of training ammunition costs; a gun propulsion technology program which will develop improved approaches to the design of ammunition through integration of the component technologies of propellant development, to include development of stick propelling charges and a combustible cartridge case for advanced field artillery weapons systems, and development of the XM864 extended range (basebleed) projectile. A fuze development program focused on increasing the operational effectiveness of present munitions and advances in electronic fuze technology now offer the opportunity to realize both hand-set and automatic-set capability in electronic fuzing for artillery. This program is exploiting the technology for the next-generation 200-second electronic time artillery fuze and will transition to engineering development in PE 6.46.31 D175 in FY83. Project D276, SADARM, will continue to support advanced development of the Sense and Destroy Armor (SADARM) to provide a fire-and-forget antitank capability to the Field Artillery. The SADARM mechanism. Upon ejection from the artillery projectile, the parachute stabilizes the submunition and imparts a spin to provide a scanning capability for the sensor, which activates the lethal mechanism when a target is sensed at an appropriate range.
- G. (U) <u>RELATED ACTIVITIES</u>: The development items in this program are directly related to exploratory research being done in Program Element 6.26.03.A, Large Caliber & Nuclear Technology. Follow-on engineering development is conducted in Program Element 6.46.31, SADARM. Developments in this program element are compatible with US Marine Corps requirements and are coordinated to preclude duplication of effort. Prior to FY 1979, work now done under project DOOS, in Program Element 6.36.29.A, Field Artillery Cannon System, was conducted in this program element. Assumition development conducted in this PE continues to be closely coordinated with all developments in PE 6.36.29.A. Fuze development work was accomplished in Program Element 6.36.13.A, Advanced Puze Design, prior to FY 1981.
- H. (U) WORK PERFORMED BY: US Army Armament Research & Development Command (ARRADCOM), Dover, NJ; Watervliet, NY; and Aberdeen, HD; Army Materiel Systems Analysis Agency, Aberdeen, HD; Harry Diamond Laboratories and US Army Electronics Research and Development Command, Adelphi, HD; US Army Armament Readiness Command, Rock Island, IL; and US Army Test and Evaluation Command, Aberdeen Proving Ground, HD. Contractors include General Electric Company, Burlington, VT, and Syracuse, NY; Chamberlain Corporation, Waterloo, IA; Aerojet Electro Systems, Azuma, CA; Honeywell Aerospace and Defense Group, Hopkins, HN; Motorola Inc, Scottsdale, AZ; Ferruimatic Inc, Patterson, NJ; Longhorn AAP, Marshall, TX; and Armtec, Coachella, CA.

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Program Element: # 6.36.28.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Field Artillery Ammunition Development
Budget Activity: 34 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: The qualification of alternate explosive fill in artillery projectiles was completed in 1977, and surveillance monitoring of climatically conditioned munitions to establish storage characteristics continued through 1978. The EM711, 8-inch High Explosive (HE) projectile development was initiated in 1976 and was terminated in FY 1978 as not providing sufficient improvement over the standard M106 projectile to justify further development. In FY 1977 work was initiated on an inert 155mm artillery training projectile and a concrete-filled plastic 81mm mortar training projectile, and expanded in FY 1978 to include 60mm mortars. Fuze and spotting signatures were evaluated, low-cost packaging design was conducted, and 81mm concrete rounds were fabricated and tested for cartridge integrity. In FY79 advanced development of the training projectiles was completed and transitioned to engineering development in Program Element 6.46.28, Indirect Fire Training Munitions. The gun propulation program was initiated in FY 1978 with major technical efforts to investigate improved high-energy igniters and propelling charges using high-force, cool-burning stick propellants. In FY79 efforts were expanded to fabricate a variety of propelling charges which will be tested against tube wear requirements. Fuze development accomplishments were achieved in Program Element 6.36.13.4, Advanced Fuze Design. In FY80 the propulsion program was continued with investigations of refractory metal liners and coatings in 105mm and 155mm gun tubes, to determine liner retention and effectiveness in improving tube wear and erosion. Development of combustible cases for improved handling was begun. Testing of plastic rotating bands and thin-walled projectiles, and advanced development of Emproved handling was begun. Testing of plastic rotating bands and thin-walled projectiles, and advanced development of the Sense and Destroy Armor Hunition (SADARM) were initiated. In FY81 initial design efforts began on the RM864
- 2. (U) FY 1982 Program: Begin advanced development of the 155mm modular charge which concentrates on the design, fabrication, and evaluation of new propelling charges which permit the use of cool-burning propellant at higher loading densities and modular charges for some simplification. Complete combustible case charge design and conduct evaluations in larger caliber cannon. Conduct high some firings of chemically bonded plastic rotating bands. Complete advanced development of the XM762, 200-second extillery electronic time fuzes, initiated in PE 6.36.13.A, Advanced Fuze Design, and transition to engineering development in PE 6.46.31, D175. Continue development of the Sense and Destroy Armor Munition (SADARM). Advanced development of the XM684 extended range projectile will continue.
- 3. (U) FY 1983 Planned Program: Continue development of cool-propellant, modular charges, high-loading-density propelling charges and alternate ignition systems. Test combustible cartridge case configurations. Continue advanced development of the Sense and Destroy Armor Munition (SADARM). Continue advanced development of the XM684 extended range projectile. Initiate development of the XM880 81mm training projectile.

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Program Element: # 6.36.28.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Field Artillery Ammunition Development
Budget Activity: 44 - Tactical Programs

- 4. (U) FY 1984 Planned Program: Advanced development of SADARM will continue through the end of FY 1983, followed by award of the engineering development contract to the contractor providing the best design as determined by a competitive shootoff. SADARM transitions to engineering development in PE 6.46.31, Project D369. Continue advanced development of the XM880 81mm training projectile, modular stick propelling charges, and extended range RM864 projectile.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project D007
Program Element: #6.36.28.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Field Artillery Ammunition and Fuzes
Title: Field Artillery Ammunition Development
Budget Activity: #4 ~ Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: This project provides for: Development of inert metal mortar training projectiles for low-cost, realistic training and significant avoidance of training ammunition costs; a gun propulsion technology program which will develop improved approaches to the design of ammunition through integration of the component technologies of propellant development, alternate propellant formulations and ignition studies, projectile/tube interactions and cannon tube wear and erosion. The 155mm Hodular stick propelling charge and a fuse development program focused on increasing the operational effectiveness of present munitions. The development of an extended range projectile XM864 will enhance the attack capability of improved conventional munitions. Advances in electronic fuze technology now offer the opportunity to realize both hand-set and auto set capability in electronic fuzing for artillery and exploit the technology for the XM762 200-second, hand-set, autoset electronic time artillery fuze.
- B. (U) RELATED ACTIVITIES: The development items in this program are directly related to exploratory research being done in Program Element 6.26.03.A, Large Caliber & Nuclear Technology. Follow-on engineering development is conducted in Program Elements: 6.46.31, Firld Artillery Ammunition, and 6.46.28.A, Indirect Fire Training Munitions. Developments in this program element are compatible with US Marine Corps requirements and are coordinated to preclude duplication of effort. The fuze development work to be accomplished in this project was formerly done in Program Element 6.36.13.A, Advanced Fuze Design.
- C. (U) WORK PERFORMED BY: US Army Armament Research & Development Command (ARRADCOM), Dover, NJ; Watervliet, NY; and Aberdeen, MD; Army Materiel Systems Analysis Agency, Aberdeen, MD; Harry Diamond Laboratories and US Army Electronics Research and Development Command, Adelphi, MD; US Army Armament Readiness Command, Rock Island, IL; and US Army Test and Evaluation Command, Aberdeen Proving Grounds, MD. Contractors include General Electric Company, Burlington, VT, and Syracuse, NY; Chamberlsin Corporation, Waterloo, IA; Hotorola Inc., Scottadele, AZ; Ferrulmatic Inc, Patterson, NJ; Longhorn AAP, Marshall, TX; Armtec, Coachella, CA.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishment: The qualification of alternate explosive fill in artillery projectiles was completed in 1977, and surveillance monitoring of climatically conditioned munitions to establish storage characteristics

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Project #D007

Program Element: #6,36.28.A

DOD Mission #212 Indirect Fire Support

Title: Field Artillery Ammunition and Fuses
Title: Field Artillery Ammunition Development
Budget Activity #4 - Tactical Programs

continued through 1978. The XM711, 8-inch High Explosive (HE) projectile development was initiated in 1976 and was terminated in FY 1978 as not providing sufficient improvement over the standard M106 projectile to justify further development. In FY 1977 work was initiated on an inert 155mm artillery training projectile and a concrete-filled plastic 81mm mortar training projectile, and expanded in FY 1978 to include 60mm mortars. Fuze and spotting signatures were evaluated, low-cost packaging design was conducted, and 81mm concrete rounds were fabricated and tested for cartridge integrity. In FY79 advanced development of the training projectiles was completed and transitioned to engineering development in Program Element 6.46.28, Indirect Fire Training Munitions. The gun propulsion program was initiated in FY 1978 with major technical efforts to investigate improved high-energy igniters and propelling charges using high-force, cool-burning propellants. In FY79 efforts were expended to fabricate a variety of propelling charges which will be tested against tube wear requirements. Fuze development accomplishments were achieved in Program Element 6.36.13.A, Advanced Fuze Design. In FY81 all fuze component assemblies were fabricated and sucessfully tested in the laboratory. In FY80 the gun propulsion program was continued with investigations of refractory metal liners and coatings in 105mm and 155mm gun tubes to determine liner retention and effectiveness in improving tube wear and erosion, and develop combustible cases for improved handling. Testing of plastic rotating bands and thin-walled projectiles was initiated. In FY81 initial design efforts on the KM864 extended range dual-purpose improved conventional munition round began and initial design work was begun on a modular stick propelling charge.

- 2. (U) PY 1982 Program: Continue design, fabrication, and evaluation of new propelling charges such as the modular charge which permit the use of cool propellant at higher loading densities and zone simplification. Complete combustible case charge design and conduct evaluations in larger caliber cannon. Conduct high zone firings of chemically bonded plastic rotating bands. Complete advanced development of the 200-second artillery electronic time fuze initiated in PE 6.36.13A, Advanced Fuze Design.
- 3. (9) FY 1983 Planned Program: Continue development of cool-propellant high-loading-density modular charges. Finalize combustible cartridge case configurations. Begin inductive ignition studies. Initiate development of the XM880, 81mm 1/10 range mortar training projectile and a dummy ICM/submunition training projectile. Complete AD of 200-aecond artillery electronic time fuze and transition to Engineering Development in PE 6.46.31.A. Continue advanced development of the XM864 extended range projectile.
 - 4. (U) FY 1984 Planned Program: Finalize modular propelling charge configuration for advanced development. Advanced

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Project #D007

Program Element: \$6.36.28.A
DOD Mission \$212 Indirect Fire Support

Title: Field Artillery Ammunition and Fuzes
Title: Field Artillery Ammunition Development
Budget Activity #4 - Tactical Programs

designs in high-loading-density charges, solventless propellants, and base bleedcombustion will be evaluated. A range increase of 10% to 30% will be sought. A refactory metal-coated liner approach will be used on 155mm systems to achieve gun tube wear improvements of 100 to 200%. The XM864 extended range projectile advanced development will be completed. Development of the XM880 81mm 1/10 range training projectile will continue.

- 5. (U) Program to Completion: This is a continuing program.
- 6. (U) Major Milestones: Not Applicable.
- 7. (U) Resources (\$ in thousands):

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	4107	6265	491 3	14947	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	4689	6284	11645	Not Shown	Continuing	Not Applicable

Reduced FY 1981 funding reflects reprograming actions to support higher priority efforts. Decrease in FY82 funds is a result of revised inflation and civilian pay pricing indices. The decrease in FY83 is a result of program restructuring.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D276
Program Element: #6.36.28.A
DOD Mission Area. # 212 - Indirect Fire Support

Title: Sense and Destroy Armor (SADARM)
Title: Field Artillery Amsunition Development
Budget Activity: 14 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: Threat studies indicate that massive armor attack is the principal ground threat in Europe. Artillery will be required to perform a key role in responding to massed armored assults since it has the capability to bring extensive fire power from distant standoff, protected positions. The Sense and Destroy Armor (SADARM) round will be part of the 8-inch Artillery Weapon Systems family which will provide the capability to attack armored targets that are beyond the direct observation of friendly forces. It is intended that the system will be deployed and fired using current and future fire delivery and target acquisition techniques. SADARM will provide a fire-and-forget, near all-weather antiarmor projectile, carrying self-contained target-sensing submunitions. Using volley fire, it can attack areas containing self-propelled field artillery, air defense and/or massed armored units that are well beyond the FEBA and beyond the range of direct fire systems. Employment concepts including the use of SADARM in combination with artillery-delivered antiarmor and antipersonnel mines would combine to keep such units in double jeopardy by killing targets if they moved (mines) or if they remained stationary (SADARM). The excellent system accuracies of the artillery-locating radars and other target acquisition devices together with the 8-inch howitzer combine to make this a most effective counterfire weapon. Additionally, employment concepts would feature the SADARN 8-inch munition in preplanned fires against hardened targets such as defense positions and assembly areas. Such targets, containing both armoved and unarmoved vehicles, are very vulnerable to SADARM's lethality. SADARM's high terminal effectiveness will greatly reduce the number of projectiles required to defeat the target. Its self-contained target-seeking capability will eliminate the need for the forward observer to track individual targets, thus reducing forward observer exposure time. Since multiple submunitions are carried into the target area by one carrier, the potential exists for attacking many targets simultaneously. SADARN attacks from above; therefore, it will be difficult for the enemy to hide or resort to defilade tectics.
- B. (U) RELATED ACTIVITIES: This project follows from exploratory development Program Element 6.26.03.A, AH-18 (Large Caliber and Nuclear Technology), where a prototype submunition design was fabricated and successfully demonstrated.
- C. (U) WORK PERFORMED BY: Principal Army Management Agency is the Armament Systems Directorate, ARRADCOM, Dover, NJ. In-house support is provided by the Large Caliber Weapon Systems Laboratory, ARRADCOM; Ballistics Research Laboratory, ARRADCOM, Aberdeen, MD; US Army Test and Evaluation Command Activity, Aberdeen, MD. Principal contractors are: Aerojet Electro Systems, Asusa, CA, and Honeywell Defense Systems Division, Hopkins, MN.

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Project: #D276

Program Element: #6.36.28.A

DOD Mission Area: # 212 - Indirect Fire Support

Title: Sense and Destroy Armor (SADARM)

Title: Field Artillery Ammunition Development

Budget Activity: F4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: The feasibility of a Sense and Destroy Armor (SADARM) submunition, including sensor, warhead, and parachute, was successulfully demonstrated. A Letter of Agreement (LOA) was approved and Advanced Development (AD) initiated with two competing contracts awarded for a 4-phase, 38-month program, culminating in a DT 1/0T I shootoff. Phase I, Documentation/Study, was completed with both contractors establishing their baseline designs. Phase II, Component Design, was initiated; however, a shortfall in funding necessitated program extension by 6 months (44 months to complete AD). Component prototype hardware was fabricated, and initial test and evaluation began.
- 2. (U) FY 1982 Program: The AD, Phase II, effort will be completed, and Phase III subsystem and system integration will be initiated. The sensor field test data will be analyzed, and a warhead firing algorithm will be designed into system microprocessor logic. Orientation, stabilization, and dispersion techniques, and warhead self-forging fragment will be integrated into the SADARM submunition design.
- 3. (U) FY 1983 Planned Program: Subsystem design integration, with test and evaluation will be completed. Phase IV, System Design and Development, will be initiated. Static and ballistic evaluation of the SADARM, a submunition integrated into the carrier projectile, will be completed. Farbrication of full-up XM836 projectiles will be initiated for evaluation and support of DT 1/OT 1.
- 4. (U) FY 1984 Planned Program: Conduct DT I/OT I evaluation of the competing contractor designs. Conduct Validation IPR and transition the XM836 into full-scale Engineering Development (PE 6.46.31). Utilizing the technology developed for the XM836 SADARM, effort will be applied to the improved top-attack weapon, improved long-standoff Dual Purpose Improved Conventional Munitions (DP ICM) and other improved sensing munitions tasks.
 - 5. (U) Program to Completion: This is a continuing program.

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Project: #D276
Program Element: #6.36.28.A
DOD Mission Ares: # 212 - Indirect Fire Support

Title: Sense and Destroy Armor (SADARM)

Title: Field Artillery Ammunition Development
Budget Activity: #4 - Tactical Programs

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
	40FY83	20FY83
DT-I Validation IPR	2QFY84	2QFY83
DT-11 TC/LP	3QFY86	2QFY85 2QFY85
DEVA-IPR/TC	2QFY87	1QFY86
Full-Scale Production	4QFY87	4QFY86

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

(c) nessures (y sii sii sassas)	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	7798	18382	19038	17676	27558*	90452*
Funds (as shown in FY 1982 submission)	7586	18438	12938	_	33226*	74500*

The FY81 increase is due to internal Army reprograming. The FY82 decrease is due to the application of revised inflation and civilian pay pricing indices. The FY83 decrease is due to internal Army reprograming.

*Includes Engineering Development in PE #6.46.31.A, Project D369.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.36.29.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Division Support Weapon System (DSWS)
Budget Activity: F4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	5696	2032	8941	79127	Continuing	Not Applicable
D008	155mm SPH System RDTE	5696	2032	8941	79127	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The M109 155mm Self-Propelled Artillery Weapon System provides indirect fire support to the maneuver forces of the Armored and Mechanized Divisions/Brigades. Indirect fire support provided by this system includes the destruction, neutralization, and suppression of targets within the maneuver commander's area of responsibility. The purpose of the 155mm SPH System RDTE Improvement Program is to ensure that the US Army maintains a responsive, survivable, reliable, and lethal 155mm Self-Propelled Howitzer System through near-term improvement of the currently fielded M109 Self-Propelled Howitzer System. Development of a new system may be considered for the far term. Timing for a new system will be dependent upon the extent of the improvements that can be made to the M109 System. A US Army Study Group is being formed in 2QFY82 to consider the various RDTE cannon system improvement alternatives and make recommendations to the Army Systems Acquisition Review Council.
- C. (U) BASIS FOR FY 1963 RDTE REQUEST: FY 1983 funds are required to complete Mi09 testing and analysis as well as other analyses and reports required for the Army Systems Acquisition Review Council. Contracts will be awarded to initiate fabrication and testing of selected RDTE improvements to the 155mm self-propelled cannon system, such as a semiautomatic loader and a new recoil system.

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Program Element: # 6.36.29.A

DOD Mission Ares: #212 - Indirect Fire Support

Title: Division Support Weapon System (DSWS)
Budget Activity: 44 - Tactical Programs

D. (U) COMPARISON WITH PY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Betimated Cost
RDTE	5696	2032	8941	Continuing	Not Applicable
Funds (current requirements) Funds (as shown in FY 1982	5798	2032	15556	Continuing	Not Applicable
submission)	2130				

The decrease in funding for FY82 was due to the amended budget request and the application of revised inflation and civilian pay pricing indices. The decrease in funding for FY83 was due to reprograming to higher priority Army requirements.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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Program Element: # 6.36.29.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Division Support Weapon System (DSWS)
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of the 155mm SPH System RDTE Improvement Program is to maintain a responsive, lethal, and survivable 155mm Self-Propelled Cannon System that will provide close indirect fire support to maneuver forces of the heavy Division/Brigade. A Mission Element Need Statement defining deficiencies in the currently fielded M109 155mm Self-Propelled Cannon System was approved by the Secretary of Defense on 12 December 1980. A broad systems approach was taken in conducting preliminary investigations of possible alternative systems. Rocket/Missile as well as cannon alternatives were considered. New howitzer system concepts as well as M109 improved variants have been considered, with both US and foreign technologies being included. Preliminary investigations of rucket/missle concepts have shown that there is no viable rocket/missile candidate that will be able to replace the 155mm cannon system. The Army will thus initiate a Special Study Group to consider cannon system improvement alternatives during the second quarter FY 1982. This group will focus primarily on H109 Growth Potential, but will also consider the new cannon system alternatives generated during the preliminary investigations, in order to provide the Army Systems Acquisition Review Council with a complete basis for comparison. Proposals for major improvement of the M109 include the possibility of installing a semiautomatic loader and a recoil mechanism that will allow installation of the US M199 cannon which is now on the US M198 towed howitzer and would give the M109 a 30KM range capability. These proposals look promising from the preliminary studies, but further tests and analyses are required to determine the capability of the M109 to accommodate the additional weight. These tests will be conducted in 1982 and include a 4000-mile road test of the chassis carrying the additional weight; a comprehensive stress analysis of the M109 chassis; a study of the fessibility of installing a new engine; fabrication of a mockup to determine whether the new modifications will fit into the cab in a workable manner; and monitoring of the European SP70 155mm Self-Propelled Howitzer progress since the preliminary auto loader and recoil designs were based on SP70 technology. The Army's starting premise based on reasonable engineering judgment is that the proposed N409 system modifications will work. The tests outlined above, however, are designed to resolve any remaining questions.

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Program Element: # 6.36.29.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Division Support Weapon System (DSWS)
Budget Activity: #4 - Tactical Progress

G. (U) RELATED ACTIVITIES: The following are related activities. These projects are being monitored to ensure that no duplication is taking place.

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6.26.03
                Large Caliber and Nuclear Technology;
6.26.03
                Large Caliber and Nuclear Technology;
6.33.06
                Terminally Guided Projectiles;
6.46.03
                Nuclear Munitions, Improved 155mm Nuclear Projectile;
6.36.28
                Field Artillery Ammunition Development, Modular Charges,
                 Automatic Set Puzes; Sense and Destroy Armor
6.46.14
                FA Weapon and Ammunition, 155mm;
6.46.21
                Copperhead:
6.46.31
                Field Artillery Ammunition, Sense and Destroy Armor (SARDAM) Munition;
6.48.28
                Indirect Fire Training Munitions;
6.27.46
                Tactical Automatic Data Processing Technology;
2.37.26
                Advanced Field Artillery Tactical Data Systems;
6.37.23
                Command and Control, Military Computer Family;
6.47.27
                Command and Control, Military Computer Family;
6.37.13
                Joint Tactical Information Distribution Systems;
6.46.02
                Joint Tactical Information Distribution Systems;
6.47.51
                Single Integrated Channel Ground and Air Radio System;
                (SINCGARS) Engineering Development;
6.47.79
                Joint Integrated Tactical Command and Control;
6.37.41
                Meteorological Equipment Development;
6.47.26
                Meteorological Equipment Systems, Meteorological/Data System;
                Combat Vehicle Propulsion Systems;
6.36.21
                Advanced Diesel Systems;
6.36.26
6.36.31
                Combat Vehicle Turret and Chassis.
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H. (U) WORK PERFORMED BY: Contracts for system concept studies were executed by Food, Machinery and Chemical Corp (FMC), San Jose, CA, Pacific Car and Foundry Corporation, Renton, WA, and Norden Systems, Norwalk, CT, as prime contractors. In-house developing organizations participating in the program are: US Army Armament Research and Development Command

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Program Element: # 6.36.29.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Division Support Wespon System (DSWS)
Budget Activity: #4 - Tactical Programs

(ARRADCOM), Dover, RJ, Edgewood, MD, Aberdeen, MD, and Watervliet, NY; Army Materiel Systems Analysis Agency (ANSAA), Aberdeen, MD; Defense Advanced Research Projects Agency (DARPA), Arlington, VA; US Army Test and Evaluation Command (TECOM), Aberdeen, MD; US Army Operational Test and Evaluation Agency (OTEA), Falls Church, VA; US Army Field Artillery Board (USAFAB), Ft 8111, OK; US Army Field Artillery School (USAFAS), Ft 8111, OK; US Army Training and Doctrine Command (TRADCC), Ft Monroe, VA: US Army Tank Automotive Command (TACOM), Warren, MI; US Army Armsment Materiel Readiness Command (ARRCOM), Rock Island, IL; US Army Communications Electronics Command, Ft Monmouth, NJ, US Army Electronics Research and Development Command, Adelphi, MD; US Army Missile Command, Redstone, AL; US Army Mobility Equipment Research and Development Command, Ft Belvoir, VA; US Army Human Engineering Laboratory, Aberdeen, MD.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: During FY 1979, an Army team conducted an Artillery Systems Engineering Study to establish and assess artillery system concept alternatives for a significantly improved 155mm artillery weapon system to meet the 1990-2010 threat. The three concept definition contractors selected in competition in 1QFY80 were given the results of this study along with broad performance goals to begin their trade-off and sensitivity analyses. Each contractor developed a conceptual system to meet and defeat the 1990-2010 threat using a combination of current 1990 technology and revised tactics and employment doctrine. The 1QFY81 General Officers Review of these concept definition efforts concluded that significant improvements to artillery system performance, responsiveness, survivability, terminal effects, and reliability could be achieved. Second and third quarter efforts focused on structuring program alternatives and developing preliminary baseline cost estimates required to enter the validation phase of an RDTE program. A 4QFY81 review by the Army Staff resulted in direction to prepare for an Army/Defense Systems Acquisition Review Council not later than 2QFY83. Emphasis will be on maximum improvement of the M109 although new system alternatives will also be considered in order to provide complete information to the ASARC. DA directed that a Special Study Group be established not later than 1QFY1982.
- 2. (U) FY 1982 Program: FY 1982 efforts concentrate on the test and analysis of the M109 chassis as well as additional analyses, concept refinement, and baseline cost and report development required for an Army/Defense Systems Acquisition Review Council to be held not later than 2QFY83. Concurrently, functional system performance specifications, acquisition strategies, and statements of work documentation required for competitive procurement packages for validation phase development will be accomplished.
 - 3. (U) FY 1983 Planned Program: Complete M109 chassis tests and analyses; prepare analyses and reports required for

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Program Element: # 6.36.29.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Division Support Weapon System (DSWS)
Budget Activity: #4 - Tactical Programs

an Army/Defense Systems Acquisition Review Council 207783 selection. Complete preparation and release of a competitive procurement package by 207783. Initiate fabrication and testing of selected components such as a semiautomatic loader and a new recoil mechanism.

- 4. (U) FY 1984 Planned Program: Source selection activities will be completed and contractors will be awarded validation phase development contracts in 2QFY84. The winning contractor(s) will develop prototype vehicles, including integration of C³ equipment and NBC protection while designing for minimum life cycle cost.
- 5. (U) Program to Completion: Prototype vehicles will be tested to demonstrate their capability to meet required performance specifications. The product improvement schedule projects a production decision in 1QFY88 and initial operational capability in 1QFY90.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.32.A DOD Mission Area: #215 - Land Warfare Support Title: Armored Combat Logistical Support Vehicle
Budget Activity: #4 - Tactical Programs

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

Project <u>Number</u>	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 4188 5 FAASV	FY 1982 Estimate 101	FY 1983 Estimate	FY 1984 Estimate 6350 4 APARV	Additional to Completion 20162	Total Estimated Cost 30801 9 Prototype Vehicles
D154	Armored Forward Area Rearm Vehicle	595	-	-	6350	20162	27107
D109	Field Artillery Ammunition Support Vehicle	3593	101	-	-	-	3694

- (U) NOTE: D154 (Armored Combst Support Vehicle Family) project was changed to the Armored Forward Area Rearm Vehicle last year as shown above. Prior to FY83, the Armored Combst Support Vehicle Family Project was used to fund both the Armored Forward Area Rearm Vehicle and the Field Artillery Ammunition Support Vehicle now in D154 and D109 respectively. The Maintenance Assist Vehicle and Hedical Evacuation Vehicle listed under the D154 project in FY81 used no funds and will not be listed under the D154 project in the future.
- B. (U) BRIEF DESCRIPTION OF PROJECT: Supports Army needs for armored combat support vehicles to meet two essential logistics roles and missions. The principal requirement of each role and mission is:
- 1. (U) Armored Forward Area Rearm Vehicle (AFARV): Resupplies tank and infantry fighting vehicle ammunition to forward deployed tank and mechanized forces in an environment of suppressive enemy artillery fires. This vehicle will provide indirect/small arms protection for both ammunition and crew, thereby allowing the AFARVs to remain in the main battle area where they will resupply the fighting capability of combat vehicles in or near their fighting positions. The AFARV will consist of a rearm module with ammunition storage racks and materiel-handling equipment mounted on a tracked chassis to provide compatible mobility characteristics with supported combat vehicles.

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Program Element: #6.36.32.A DOD Mission Area: #215 - Land Warfare Support

Title: Armored Combat Logistical Support Vehicle
Budget Activity: 44 - Tactical Programs

2. (U) <u>Field Artillery Ammunition Support Vehicle (FAASV)</u>: Provides protection of artillery ammunition during resupply of self-propelled artillery weapons in their firing positions that are subject to counterbattery fires from enemy rocket and cannon. This vehicle will replace the unprotected M548 tracked resupply vehicle, and provide armored protection for the ammunition and crew. The vehicle will have new ammunition-handling equipment permitting faster and less man-intensive ammunition resupply.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL:

- 1. (U) The Armored Forward Area Rearm Vehicle (D154) was not funded in FY83 due to reprograming to higher priority Army requirements. This will result in at least one additional year's delay of this project. Based on the maturity of the chassis and materiel-handling equipment, the program should enter full-scale engineering development in FY84.
- 2. (U) The Field Artillery Ammunition Support Vehicle completes its development program in FY82, and procurement will be initiated in FY83.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.33.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Tank and Hortar Assumition

Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 1999	FY 1982 Estimate	FY 1983 Estimate 9053	FY 1984 Estimate 12680	Additional to Completion Continuing	Total Estimated Cost Not Applicable
D161	Tank Ammunition and Puzes	1999	0	7465	12680	Continuing	Not Applicable
D164	Long Rod Penetrating	0	0	1588	0	0	1588

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The purpose of this program is to develop ammunition to counter future direct fire combat enemy threats by improving terminal effectiveness, accuracy, range, and reliability. This program consists of two projects: D161, Tank Ammunition and Fuzes, and D164, Long-Rod Penetrator. Project D161 provides for the si-enced development of the 105mm High-Explosive, Antitank, Multipurpose Tracer (HEAT-MF-T) as a companion to the XN833 Armor-Piercing, Fin-Stabalized, Discarding Sabot-Tracer (APFSDS-T) cartridge, which will combat the threats beyond the FY 1982 timeframe. The XM833 is scheduled to enter production in FY83. Project D164 provides for the advanced development of a new 25mm service round for the Fighting Vehicle System. The need exists for an improved cartridge that will provide a significant increase in engagement and standoff range capabilities against enemy light armor threat systems. The development of this round will enable the Fighting Vehicle System to engage threat systems at the longer ranges and still achieve a greater plate penetration, and therefore, a higher kill capability.
- C. (U) BASIS FOR FY 1983 RDTE Request: The FY 1983 program continues advanced development of the XM815 HEAT-MP-T cartridge. Funds will support the completion of Development Testing I (DT I), leading to a validation In-Process Review (IPR) in early 4QFY83. The round will transition to Engineering Development in 4QFY83. Funds also support the completion of advanced development of the Long-Rod Penetrator. DT I testing will be completed in 3QFY83, and the validation IPR will be held during 4QFY83.

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Program Element: #6.36.33.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Tank and Mortar Ammunition
Budget Activity: #4 - Tactical Programs

Major Milestones

Current Milestone Dates

Milestone Dates Shown in FY 1982 Submission

XM815 Validation In-Process

Review

4QFY83

40FY81

The delay in the XH815 is due to the late start of advanced development in FT81 at a reduced level of funding.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	PY 1983	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	1999	0	9053	Continuing	Continuing
funds (as shown in FY 1982	Not	Not	Not	_	_
submission)	Shown	Shown	Shown	Not Shown	Not Shown

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

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Program Element: #6.36.33.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Tank and Mortar Ammunition
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: Two projects are being pursued under this Program Element. Project D161 supports the advanced development of 105mm tank ammunition, and more specifically, the High-Explosive Antitank Multipurpose-Tracer (HEAT-MP-T) XM815, and in future years, the advanced development of the Rocket-Assisted XM872 cartridge. Project D164 supports the development of 25mm ammunition for the Fighting Vehicle System (FVS). The Long-Rod Penetrator will provide the FVS with increased capability and standoff range.
- G. (U) RELATED ACTIVITIES: This program continues in PE 6.46.32, 105mm Tank Ammunition, and to PE 6.46.01, Infantry Support Munitions.
- H. (U) WORK PERFORMED BY: In-House agencies include the US Army Armament Research and Development Command (ARRADCOM), Dover, NJ; US Army Test and Evaluation Command, Aberdeen, MD; and Yuma Proving Ground, Yuma, AZ. Contractors include: Chamberlain Mfg. Corp, Waterloo, IA; Flinchbauch Products, Inc, Red Lion, PA; Nuclear Hetals, Inc, Concord, MA; Dayron Corp, Orlando, FL; Bulova Systems & InstrA. Div, Valley Stream, NY; and Physics International, San Francisco, CA. The project is managed by Project Manager, Tank Main Armament Systems, Dover, NJ, to insure no duplication of efforts.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Project DI61 was funded through Army reprograming in FY 1981. In FY 1980 the XM815 105mm High Explosive, Antitank, Multipurpose, Tracer (HEAT-MP-T) projectile metal parts configuration was designed. In FY 1981 projectiles were fabricated, inert loaded, and fired. The potential to achieve the accuracy requirement was demonstrated. The XM833 Armor-Piercing, Fin-Stabalized, Discarding Sabot-Tracer (AFFSDS-T) round was tested using various penetrator and sabot designs in FY 1980. Development Testing I (DT I) was completed, and entry into Engineering Development (ED) was approved by a validation In-Process Review (IPR). In FY 1981 the XM833 transitioned to ED (PE64632, Project DG21).
 - 2. (U) FY 1982 Program: Continue Advanced Development and initiate preliminary testing on the XM815.
-). (U) FY 1983 Planned Program: Continue advanced development and complete necessary testing to transition the XM815 round to Engineering Development in FY 1984. For the Long-Rod Penetrator, prototype hardware will be procured, assembled, and tested, and the Productibility Engineering and Planning (PEP) phase initiated.

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Program Element: #6.36.33.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Tank and Mortar Ammunition
Budget Activity: #4 - Tactical Programs

- 4. (U) FY 1984 Planned Program: Initiate advanced development of the XM859 improved chemical energy round and the XM872 high-velocity kinetic energy round.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONCRESSIONAL DESCRIPTIVE SUMMARY

Project: #D161
Program Element: #6.36.33.A
DOD Mission Ares: #211 - Direct Fire Support

Title: Tank Ammunition and Figes
Title: Tank and Mortar Ammunition
Budget Activity: #4 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The 105mm cartridge High-Explosive Antitank Multipurpose Tracer (XM815) is a companion to the cartridge, Armor-Piercing Fin-Stabilized, Discarding Sabot-Tracer (APPSDS-T) XM833 and provides a significantly improved capability against light armored vehicles, fortifications, and personnel.
- B. (U) RELATED ACTIVITIES: This project continues into Engineering development in P.E. 6.46.32.A/DG21, 105mm Tank Service Ammunition. Prior year efforts were funded in P.E. 6.36.08.A/DI61. Tank Ammunition.
- C. (U) WORK PERFORMED BY: In-house agencies include US Army Armament Research and Development Command (ARRADCOM) Dover, NJ; US Army Test and Evaluation Command, Aberdeen, MD; Yuma Proving Ground, Yuma, AZ; contractors include: Chamberlain Mfg. Corp., Waterloo, IA, Flinchbauch Products, Inc., Red Lion, PA; Nuclear Metals, Inc., Concord, MA; Dayron Corp. Orlando, FL; Bulova Systems and Instr Division, Valley Stream, NY; Physics International, San Francisco, CA. The project is managed by Project Manager, Tank Main Armament Systems, Dover, NJ, to insure no duplication of effort.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: The validation phase for this round was initiated based upon a successful conceptual In-process Review during 1981. The technology to improve aeroballistic and armor penetration performance was demonstrated.
 - 2. (U) FY 1982 Program: Continue Advanced development and initiate preliminary testing.
- 3. (U) FY 1983 Planned Program: Continue advanced development and complete necessary testing to satisfy all critical technical issues including improved hit probability. Conduct the validation In Process Review during the Fourth Quarter. All necessary experimental work will be performed, and the round will be ready for full-scale development.
- 4. (U) FY 1984 Planned Program: Initiate advanced development of the XM859, an improved chemical energy round with improved extended range performance, and the XM872, a high-velocity kinetic energy round. Inherent in this concept is the use of a sustainer rocket engine to maintain the flight velocity at a constant value and a timer to ignite a booster rocket to propel the payload to a velocity suitable for target defeat.

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Project: #D161
Program Element: #6.36.33.A
DOD Mission Area: #211 - Direct Fire Support

Title: Tank Ammunition and Puzes
Title: Tank and Mortar Ammunition
Budget Activity: #4 - Tactical Programs

5. (U) Program to Completion: Current plans call for completion of advanced development for the XM859 and the XM872 in FY 1985.

6. (U) Major Milestones:

Current		Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1982 Submission
XM8.5 Validation In-	4	4
Process Review	4Q FY83	4Q FY81

Delay due to late initiation of this program.

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

FY 1981 Actual	PY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
1999	0	7465	12680	Continuing	Not Applicable
,	·	05	12000	0011021102116	approve
0	0	0	0		
0	0	0	0	Not Applicable	Not Applicable
982 N/S	N/S	N/S	N/S	Not Shown	Not Shown
	1999 0 0	Actual Estimate 1999 0 0 0 0 0 982	Actual Estimate Estimate 1999 0 7465 0 0 0 0 0 0 0 00000000000000000000000	Actual Estimate Estimate Estimate 1999 0 7465 12680 0 0 0 0 0 0 0 0 982 0 0 0	Actual Estimate Estimate Estimate to Completion 1999 0 7465 12680 Continuing 0 0 0 0 0 0 0 Not Applicable

The validation phase for the XM815 round was initiated through internal reprograming after a successful concepual In-Process Review in FY 1981. Late receipt and application of those funds resulted in a delay in the validation phase. In FY 1983

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Project: #D161
Program Element: #6.36.33.A
DOD Mission Ares: #211 - Direct Fire Support

Title: Tank Ammunition and Puzes
Title: Tank and Mortar Ammunition
Budget Activity: 54 - Tactical Programs

funds allow completion of design iterations and accomplishment of tests. This round will proceed to full-scale engineering development in FY 1984.

(U) Other Appropriations:

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Procurement of Ammunition, Arm	,					
XM833 Cartridge Funds (current requirements) Funds (as shown in FY 1982 aubmission) ²			69300 88300	77400 N/S	Continuing	Continuing Continuing
Quantities (current requirements) Quantities (as shown in PY 1982 submission) ²			96000 114000	121000 N/S	Continuing	Continuing Continuing

- 1. Procurement of ammunition is continuous depending on usage.
- Funds and quantities shown in FY 1982 submission of PE 64632.
 Reduction in funds and quantity in FY 1983 are due to general ammunition program realignment.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gum System
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	PY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	7955	37354	48156	434049	527514
D166 D170	Hobile Protected Gun-Far Term Hobile Protected Gun-Near	0	7955	29433	46189	434049	517626
	Term	0	0	7921	1967	0	9888

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Far-Term (D166): This is a continuing program to develop a Mobile Protected Gum Sys: m (MPGS) during the late 1980's. The program objective is to provide both the US Army and the US Marine Corps with a light eight, antiarmor, assault-capable, combat weapons system that can be deployed by both strategic and tactical aircraft. This program acknowledges the Services' limited ability to deploy heavy main battle tanks quickly and in sufficient numbers by strategic aircraft. The newly developed Hobile Protected Gum will provide light divisions and other selected units with the capability to defeat threat tanks, lightly armored vehicles and wheeled vehicles. The Mobile Protected Gum System will employ a new, antiarmor automatic cannon. The new system will take full advantage of technology developments gained from the joint DARPA/Army/Marine Corps Armored Combat Vehicle Technology program; the Infantry Fighting Vehicle and M1 (Abrams) Tank programs. The program seeks to conserve dollars, minimize research and development man-hours, and provide both Services an efficient, cost effective combat fighting vehicle. Near-Term (D170): This is also a joint program to fulfill the mission needs of both Services on an interim basis until a new system is developed and fielded. The near-term system will be an off-the-shelf armored vehicle with the 25mm BUSHMASTER Chain Gun as armament. A squad carrier and recovery vehicle will be evaluated as potential variants of the basic vehicle. Lighter vehicles are also being evaluated by the Army'. High Technology Test Bed (HTTB) Division at Fort Lewis, Washington, to fulfill a variety of roles.

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Program Element: # 6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gun System
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1983 RDTE REQUEST: Far-Term: A minimum of two competitive Demonstration/Validation Phase contracts will be awarded based on an evaluation of the FY 1982 concept design studies. These contracts will allow continued refinement of the two selected vehicle system concepts; a trade-off analysis of technical and performance characteristics associated with the competing vehicle designs; establishment of interface control documentation to insure engineering correlation of subsystems as they relate to the total weapons system; i.e., armament, fire control, electronics, Nuclear, Biological, Chemical (NBC) and nuclear hardening. Funds will also support the initiation of preliminary design efforts in support of the full vehicle design/development effort. Limited government in-house support will also be funded; e.g., laboratory support and program management. Additionally, funds will continue to support advanced development of the candidate 75mm Medium Caliber Antiarmor Automatic Cannon and 75mm ammunition. Near-Term: A Light Armored Squad Carrier (LASC) and a recovery vehicle variant will be procured off-the-shelf from the winning contractor and tested. Test data will be procured to train vehicle operators and maintenance personnel for the Mobile Protectec Gun-Cannon vehicle.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Milestone "O" Approval of MENS	40FY81	(No FY 1982 Submission)
Contract Awards for Armament Development		•
(75mm)	20FY82	
Milestone "I" Approval, Army Systems		
Acquisition Review Council/		
Defense Systems Acquisition Review		
Council I	40FY82	
Competitive Contract Award for Demonstration	n/	
Validation	10FY83	
Development/Operational Test I	10FY85	
Milestone "II" Approval, ASARC II/DSARC II	30FY85	
FSED Contract Award	30FY85	
Milestone "III" Approval, ASARC III/		
DSARC III	10FY88	
Initial Production Delivery	40FY88	

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Program Element: # 6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gum System

Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 ROTE REQUEST: (\$ IN THOUSANDS)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Retimated Cost
RDTE					
Funds (current requirements)	0	7955	37354	482193	527514
MPG-FT (D166)	0	7955	29433	480226	512616
MPG-NT (D170)	0	0	7 9 21	1967	9888
Funds (as shown in 1982					
submission)	Not Ap	plicable - N	Army submi	ssion for FY 1982	

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

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Program Element: # 6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Cun System
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Because the size of our Armed Porces is constrained and the contingencies for which they must be prepared to respond are varied, our forces must be flexible and prepared for various missions. These missions encompass both NATO and non-NATO environments and require a mixture of heavy and light forces. Both the Army and the Marine Corps are planning future organizational, operational, and materiel requirements as they pertain to antiarmor systems. The purpose of the Mobile Protected Gun System program is to provide the light forces of both Services with a lightweight, strategically deployable, protected, assault-capable antiarmor system. Far-Term: The functional objectives of the developmental system are strategic deployability, tactical mobility, lethality, survivability, and sustainability. Strategic deployability will be achieved by prioritizing design considerations that make the system compatible for deployment in the USAF C5A and C141B aircraft. Tactical deployability requires USAF C130 transportability without modification as an essential element of tactical mobility. Mobility and agility on the battlefield will be achieved through design balance of vehicle geometry, mobility subsystems, horsepower-to-weight ratios, and other technology gained from the Armored Combat Vehicle Technology program as well as the Infantry Fighting Vehicle and M1 (Abrams) Tank programs. Improved lethality will be characterized by: rate of fire, accuracy, terminal effectiveness, and range. Survivability relates to the ability of the system to avoid or withstand hostile attack. Increased mobility/agility will greatly enhance survivability on the integrated battlefield. A sufficient degree of close-in protection will be achieved through a combination of armor protection, NBC hardening, screening mechanisms, reduced signature (size and silhouette) and standoff range. Sustainability or supportability relates to those weapon systems characteristics that meet logistic and training atandards. This goal will be achieved through design features that allow simplicity of operation, maintenance, and resupply. Improved systems reliability, availability, and durability will also be stressed in development. Near-Term: Near-term attainment of the cited objectives is constrained by what is currently available in essentially off-the-shelf armored systems. Therefore, a competitive evaluation and selection process has been initiated which will result in procurement of the best available off-the-shelf armored system for both services.

G. (U) RELATED ACTIVITIES: This program element reflects the merger of the Army's Hobile Protected Oun - Far Term and the Marine Corps' Mobile Protected Weapons System into a single, joint program called Mobile Protected Gun System, as well as the Army's Hobile Protected Gun-Near-Term Program which has been joined with the Marine Corps' Light Armored Vehicle (LAV) programs. Specific programs related to the technical area of this program (PE) are PE 6.36.02A, Project DII8, Armored Combat Vehicle Technology, Project DI88, High Survivability Test Vehicle; PE 6.26.01.A Tank and Automotive Technology; PE 6.26.08.A, Tank Gun Development and Tank Ammunition; PE 6.36.21.A, Combat Vehicle Propulsion Systems; and PE 6.36.31.A, Combat Vehicle Turret and Chassis. Close relationship is maintained with other Services and Governmental agencies. Research and development information concerning combat, tactical, and special-purpose vehicles is also being exchanged via

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Program Element: # 6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gun System
Budget Activity: #4 - Tactical Programs

data exchange agreements with allied countries. The near-term program is currently in its Test and Evaluation Phase. Four candidate armor systems are in competition at Twenty-Nine Palms, CA., and Yuma Proving Ground, AZ. A winning off-the-shelf system will be selected in July 1982.

H. (U) WORK PERFORMED BY: Far-Term: Primary in-house efforts are being performed by the US Army Tank-Automotive Command, Warren, MI. Other in-house efforts are being performed by the US Army's Armament Research and Development Command, Dover, NJ; Naval Surface Weapons Center, Dahlgren, VA; Human Engineering Laboratory, Aberdeen Proving Ground, MD; Marine Corps Development and Education Command, Quantico, VA; Ballistics Research Laboratory, Aberdeen Proving Ground, MD; and Test and Evaluation Command, Yuma Proving Ground, Yuma, AZ. Contracts related to this effort will be competitively awarded during FY 1982 for Concept Design Studies and FY 1983 for Validation and Demonstration of concepts. Near-Term: In-house efforts being performed by above agencies with addition of Operational Test and Evaluation Agencies from Army and USMC. Off-the-shelf candidate vehicles being competitively evaluated are from Cadillac Gage, Warren, MI; General Motors of Canada (London Ontario); ALVIS Limited, Coventry, England.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Not Applicable. This was a new start program for FY 1982.
- 2. (U) FY 1982 Program: Far-Term: Information being generated by ongoing US Marine Corps Concept Design Studies and other concluded studies, such as the Armored Combst Vehicle Technology Program, Field Analysis Concept Tests, Advanced Antiarmor Vehicle Evaluation (ARMVAL) will be compiled and evaluated. The Army will finalize its systems requirements based on the findings of the Armored Combst Vehicle Technology Program. The objective is to harmonize Army and Marine Corps requirements into a single vehicle design. A joint Program Managers Office is being established; a joint summary of requirements prepared and government in-house support activities initiated. A major activity will be the initiation of development of the 75mm cannon and ammunition. A DSARC I will occur in September 1982. Near-Term: Complete testing of candidate off-the-shelf vehicles, select a contract winner and award a production contract. USMC is funding major FY82 RUTE costs of this joint effort.
- 3. (U) FY 1983 Planned Program: Far-Term: At least two competitive Validation/Demonstration Phase contracts will be awarded. The year's effort will consist of initial system design, ordering of long-leadtime materials for prototypes, initiation of prototype fabrication, systems integration planning, initiation of Integrated Logistics Support activities and

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II-211

Program Element: # 6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Cum System
Budget Activity: 84 - Tactical Programs

selected subcomponent analysis. Near-Term: Start and complete Developmental and Operational Testing of production vehicles. Field a company of Light Armored Vehicles for the Marine Corps.

- 4. (U) FY 1984 Planned Program: Far-Term: Validation and Demonstration Phase continues. Contractors begin construction of prototypes. Preparations for DT/OT testing will be initiated. Integrated Logistics Support planning continues. In-house government support activities continue. Near-Term: Initial fielding of Light Armored Vehicles for the Army. Continue fielding vehicles of USMC.
- 5. (U) Program to Completion: Far-Term: Complete fabrication of competitive prototypes. Initiate testing and complete prototypes. Complete Validation and Demonstration Phase. Select winning contractor. Initiate Full-Scale Engineering Development (FSED) of selected system. Complete activities leading to DT/OT testing, qualification of components for production and eventual fielding of a new weapons system. Near-Term: Complete fielding of vehicles for one Army battalion.

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PY 1933 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # D166

Program Element: # 6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gun Far Term
Title: Mobile Protected Gun System
Budget Activity: #4 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The purpose of the Mobile Protected Gun program is to provide the light forces of both the Army and the Marine Corps with a lightweight, strategically and tactically deployable, tactically mobile, protected, assault-capable antiarmor combat vehicle. This program will meet the cited requirements by establishing systems requirements as functional objectives in a developmental system. Those systems requirements (functional objectives) are strategic deployability, tactical mobility, lethality, survivability and sustainability on the battlefield. Strategic deployability will be achieved by prioritizing design considerations that make the system compatible for deployment in the USAF C5A and C141B aircraft. Tactical deployability requires USAF C130 transportability without modification as an essential element. Tactical mobility and agility on the battlefield will be achieved through design balance of vehicle geometry, mobility subsystems, horsepower-to-weight ratios, and other technology gained from the Armored Combat Vehicle Technology Program, the Infantry Fighting Vehicle and M1 (Abrams) Tank programs. Increased lethality will be characterized by: rate of fire, accuracy, terminal effectiveness, and range. Survivability relates to the ability of the system to avoid or withstand hostile attack. Increased mobility/agility will greatly enhance survivability on the integrated battlefield. A sufficient degree or close-in protection will be achieved through a combination of armor protection, NBC hardening, screening mechanisms, reduced signature (size and silhouette), and standoff range. Sustainability or supportability relates to those weapon systems characteristics that minimize logistic and training burdens. This goal will be achieved through design features that allow simplicity of operation, maintenance, and resupply. Improved systems reliability, availability, and durability will also be stressed in development.
- B. (U) RELATED ACTIVITIES: This project reflects the Army's Mobile Protected Gun Far Term and the Marine Corps' Mobile Protected Weapon System, now combined into a single, joint program called Mobile Protected Gun System. Specific programs related to the technical area of this program element (PE) are: PE 6.36.02.A, Project D118, Armored Combat Vehicle Technology, Project D188, High Survivability Test Vehicle; PE 6.26.01.A, Tank Gun Development and Tank Ammunition; PE 6.36.21.A, Combat Vehicle Propulsion Systems, and PE 6.36.31.A, Combat Vehicle Turret and Chassis. Close relationship is maintained with other Services and Governmental agencies. Research and development information concerning combat, tactical, and special-purpose vehicles is also being exchanged via data exchange agreements with allied countries. There is no unnecessary duplication of effort in this program element or project.

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Project: # D166

Program Element: # 6.36.35.A

DOD Mission Ares: #211 - Direct Fire Combat

Title: Mobile Protected Gun Far Term
Title: Mobile Protected Gun System
Budget Activity: #4 - Tactical Programs

- C. (U) WORK PERFORMED BY: Primary in-house efforts will be performed by the US Army Tank-Automotive Command, Warren, MI-Other in-house efforts will be performed by the US Army's Armament Research and Development Command, Dover, NJ; Naval Surface Weapons Center, Dahlgren, VA; Human Engineering Laboratory, Aberdeen Proving Ground, MD; Marine Corps Development and Education Command, Quantico, VA; Ballistics Research Laboratory, Aberdeen Proving Ground, MD; and Test and Evaluation Command, Yuma Proving Ground, Yuma, AZ. Contracts related to this effort will be competitively awarded during FY 1982 for Concept Design Studies and FY 1982 for Validation and Demonstration of concepts.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 1981 and Prior Accomplishments: Not Applicable. This was a new start program for FY 1982.
- 2. (U) FY 1982 Program: Information being generated by ongoing US Marine Corps Concept Design Studies and concluded studies, such as the Armored Combat Vehicle Technology Program, Field Analysis Concept Tests, Advanced Antiarmor Vehicle Evaluation (ARMVAL), will be compiled and evaluated. The Army will finalize its systems requirements based on the findings of the Armored Combat Vehicle Technology Program. The objective is to harmonize Army and Marine Corps requirements into a single vehicle design. A joint Program Managers Office is being established; a joint summary of requirements prepared and government in-house support activities initiated. A major activity will be the initiation of development of the 75mm cannon and ammunition. A Defense Systems Acquisition Review Council (DSARC) I will occur in September 1982.
- 3. (U) FY 1983 Planned Program: At least two competitive Validation/Demonstration Phase contracts will be awarded. The year's effort will consist of initial system design, ordering of long-leadtime materials for prototypes, initiation of prototype fabrication, systems integration planning, initiation of Integrated Logistics Support (ILS) activities and selected subcomponent analysis. Development of the 75mm armsment system will continue. Contractor testing of hardware designs will commence. Interface requirements with competing system contractors will be finalized. Hardware for system integration will be fabricated.
- 4. (U) FY 1984 Planned Program: Validation and Demonstration Phase continues. Contractors complete construction of prototypes. Contractor testing of integrated systems will continue. Preparations for Development/Operational testing (DT/OT) will be initiated. Safety-certify armament system for testing. Integrated Logistics Support planning continues. Producibility Engineering and Planning commences. In-house government support activities continue.

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Project: # D166
Program Element: # 6.36.35.A
DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gun Far Term
Title: Mobile Protected Gun System
Budget Activity: 54 - Tactical Programs

5. (U) Program to Completion: Complete contractor tests, preparation of test support packages and Producibility Engineering and Planning. Conduct training and testing. Prepare and release request for proposal for follow-on Full-Scale Engineering Development phase. Select winning contractor. Prepare documentation for DSARC II decision milestone. Complete Demonstration/Validation Phase. Initiate Full-Scale Engineering Development. Complete activities leading to DT/OT Il testing, qualification of components for production, and eventual fielding of a new weapons system.

6. (U) Major Milestones:

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1982 Submission
Milestone "O" Approval of MENS	4QFY81	(No FY82 Submission)
Contract Awards for Armament Development (75mm)	2QFY82	
Milestone "l" Approval, ASARC I/DSARC I	4QFY82	
Competitive Contract Award for		
Demonatration/Validation	1QFY83	
DT/OT I	1QFY85	
	2QFY85	
Milestone "II" Approval, ASARC II/DSARC II	3QFY 85	
FSED Contract Award	3QFY85	
Milestone "111" Approval, ASARC III/DSARC 111	1QFY88	
Initial Production Delivery	4QFY88	

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Project: # D166
Program Element: # 6.36.35.A
DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gun Far Term
Title: Mobile Protected Gun System
Budget Activity: #4 - Tactical Programs

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

Total FY 1981 FY 1982 FY 1983 FY 1984 Additional Estimated Actual Estimate Estimate Estimate to Completion Cost RDTE 7955 29433 Funds (current requirements) 46189 434049 517626 Funds (as shown in FY 1982 submission)

* Not Applicable - No Army submission for FY 1982

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D170
Program Element: #6.36.35.A
DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gun - Near Term (MPG-NT)
Title: Mobile Protected Gun System (MPGS)
Budget Activity: #4 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Army and Marine Corps have stated an urgent requirement for a lightweight, assault-capable, protected, antiarmor, combat vehicle. The Services acknowledge that the most expeditious means of fulfilling this urgent requirement is through the competitive selection and procurement of an off-the-shelf vehicle with proven reliability, availability, and maintainability (RAM). The objective of this joint project is to insure that adequate testing of candidate vehicles is don: on which to base a logical selection of a best vehicle to meet Service requirements. A principal thrust of this effort is to select a baseline carrier vehicle from which will evolve a femily of variants. Army vehicles will include a Mobile Protected Gun cannon vehicle (25mm BUSHMASTER Chain Gun), a Light Armored Squad Carrier (LASC), and a Light Armored Recovery Vehicle (LARV). Technical characteristics common to a family of Light Armored Vehicles are: air transportability in existing aircraft; high road speed and good cross-country mobility; armor protection against small-arms fire and artillery shell fragments; Nuclear, Biological and Chemical (NBC) attack detection and protection; and weapons lethality against threat lightly armored vehicles. These vehicles will be used to equip the Joint Rapid Deployment Force (JRDF).
- B. (U) RELATED ACTIVITIES: In compliance with an 8 May 1981 DEPSECDEF directive, this project has been joined with the USMC's Project C1555-AV Lightweight Armored Vehicle (LAV) program. On 5 June 1981, a Memorandum of Agreement (MOA) was signed between the Commanding General, Tank-Automotive Command (Army), and the Commanding General, Marine Corps Development and Education Center, establishing the *pecifics of a joint Army/USMC LAV program. A Joint Program Managers Office was established at Headquarters Tank-Automotive Command, Warren, MI, on 31 August 1981. Testing/Evaluation of off-the-shelf candidate LAV's is being conducted at the USMC Air/Ground Combat Center, Twenty-Nine Palms, CA, and Yuma Proving Ground, AZ. There is no unnecessary duplication of effort.
- C. (U) WORK PERFORMED BY: Within the LAV program there are four (4) candidate vehicles competing for a production contract award. Two vehicles are from the Cadillac Gage Company, Warren, MI--V150 (4x4) wheeled vehicle and V-300 (6x6) wheeled vehicle. One vehicle, the PIRANHA (8x8) wheeled vehicle, is provided by General Motors of Ottawa, Canada. The fourth and only tracked vehicle, STORMER, from the SCORPION vehicle family, is provided by ALVIS Limited of Coventry, England. Overall in-house program responsibility belongs to the LAV Program Manager's Office and the US Army Tank-Automotive Command, Warren, MI. Test support is provided by the USA Test and Evaluation Command (TECOM), Yums Proving Ground, AZ; the USMC Air/Ground Combat Center, Twenty-Nine Palms, CA; and the Operational Test and Evaluation Agencies (OTEA) of both the Army and the Marine Corps.

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Project: #D170

Program Element: #6.36.35.A

DOD Mission Area: 1211 - Direct Fire Combat

Title: Mobile Protected Gun - Near Term (MPG-NT) Title: Mobile Protected Gun System (MPGS)
Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Not applicable. This is a new start for FY 1982.
- 2. (U) FY 1982 Program: Provide program management funding to include contractor support, office management, travel, civilian salaries, and source selection on a shared basis with the USMC. Initiate efforts to convert candidate LAV vehicles to one Army Light Armored Squad Carrier (LASC) and one Mobile Protected Gun cannon vehicle. These two Army variants will be modifications of the USMC's Light Assault variant originally provided by contractors. This effort will be done by having all three contractors provide plywood mockups of the interiors of their respective vehicles to meet Army requirements. The winning contractor will actually convert vehicles.
 - 3. (U) FY 1983 Planned Program:
- a. (U) FY 1983 will be the second year of development for the Army's Mobile Protected Gun-Near Term (MPG-NT), Light Armored Squad Carrier (LASC), and Light Armored Recovery Vehicle (LARV) variants. The FY 1983 effort will be for testing and evaluation of these two variants early in the fiscal year to support the production decision for those variants. Subsequent to that decision, the vehicles will be converted to the USMC Light Assault configuration and returned to the USMC for supplemental test and evaluation. In conjunction with the Marine Corps, two LARV (or Maintenance/Recovery) variants will be procured and tested. This testing and evaluation is to support a production decision for this variant in 4Q FY 1983. The Marine Corps and the Army will jointly fund the procurement of training devices required for variants prior to fielding. The contractor will, in addition to the reconversion effort, provide the initial elements of the Integrated Logistics Support Package; i.e., manuals, test support package, initial training packages, and Logistics Support Analysis.
- b. (U) The total estimated developmental costs are \$11 million. This estimate has been reviewed in detail by the Army and is considered adequate to complete this research project.
 - 4. (U) FY 1984 Planned Program: Complete all testing of Army variants.
- 5. (U) Program to Completion: Complete production and fielding of Army variants; i.e., cannon vehicle (MPG-NT), squad carrier, and recovery vehicle.

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Project: #D170

Program Element: #6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gun - Near Term (MPG-NT)

Title: Mobile Protected Gun System (MPGS)

Budget Activity: #4 - Tactical Programs

Current

6. (U) Major Milestones:

Major Milestones Milestone Dates Squad Carrier 1Q FY 1983 1Q FY 1983 Cannon Vehicle 1Q FY 1983 1Q FY 1983 Recovery Vehicle 2Q FY 1983 2Q FY 1983 Start Developmental Testing Start Operational Testing 20 FY 1983 1Q FY 1983 10 FY 1983 Complete All Testing 10 FY 1983 Production In-Process Review 1Q FY 1983 4Q FY 1983 .

Comparison of FY 1983 with FY 1982 milestones not applicable. No FY 1982 Congressional Descriptive Summary was submitted for this project.

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

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Eatimated Cost
Funds (current requirements)	None	0	7921	1967	None	9888
Funds (as shown in FY 1982						
submission)	Not appl	icable. No A	Army submissi	lon for FY 19	982.	
Other Appropriations:						
Weapons and Tracked Combat						
Vehicles, Procurement, Army						
Funds (current requirements)	0	0	111300	219700	739300	1070300
Quantities (current requirements)	0	0	TBD	TBD	TBD	TBD

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Project: #D170

Program Element: #6.36.35.A

DOD Mission Area: #211 - Direct Fire Combat

Title: Mobile Protected Gun - Near Term (MPG-NT)
Title: Mobile Protected Gun System (MPGS)
Budget Activity: #4 - Tactical Programs

E. (U) TEST AND EVALUATION DATA: The Test and Evaluation Master Plan (TEMP) has been finalized by participating Army and Harine Corps test agencies. That plan is pending Army Staff and DOD approval. Army and Marine Corps Operational Test and Evaluation Agencies (OTEA) are doing independent user evaluations of the candidate Light Armored Vehicles. Each agency will provide its evaluation to the joint Source Selection Evaluation Roard (SSEB) in order to influence the Board's final recommendation. The objectives of the test and evaluation are to: (1) verify manufacturer's claims pertaining to their respective vehicles, (2) determine the suitability of the candidate vehicles in an operational environment, and (3) provide data to the Source Selection Evaluation Board for selection of a production contractor.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.02.A DOD Mission Area: #215 - Land Warfare Support Title: Electric Power Sources
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	PY 1981 Actual 3052	FY 1982 Estimate 5072	FY 1983 Estimate 2998	FY 1984 Estimate 5197	Additional to Completion Continuing	Total Estimated Cost Not Applicable Not Applicable
DG10	Advanced Tactical Power Sources	1626	1475	1895	1908	Continuing	Not Applicable
DG11	Advanced Electrical Energy Sources	1426	3597	1103	3289	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: New and developing sophisticated modern weapons, fire control and communications systems depend heavily on the availability of electric power sources tailored to their requirements. The uncertain world petroleum supply situation, and the increasing cost of petroleum-derived fuels and lubricants also drive the development of newer electric power generation concepts that are capable of higher fuel efficiency and of using alternate fuels. Current engine-driven generators, particularly in the 0.5 to 10 kilowatt (kW) power range, have low fuel efficiency, limited multifuel capability and require excessive maintenance. In addition, existing mobile generators are excessively noisy and provide heat signatures that allow them to be easily detected by enemy surveillance. Present batteries and low-power sources for various battlefield communications and electronics systems have short shelf lives, are undependable, and are temperature sensitive. This program provides for the necessary development of battery power sources designed to satisfy the tactical and logistic requirements for long unactivated shelf life, high energy density, continuous long-life operation and high-performance capabilities. In addition, this program provides the necessary technologies required to develop improved mobile electric power sources with emphasis on greater mobility, higher efficiency, common components, improved reliability, reduced noise and heat signatures, and multifuel and/or non-fossil-fuel capabilities.

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Program Element: #6.37.02.A DOD Mission Area: #215 - Land Warfare Support

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

C. (U) SASIS FOR FY 1983 RDTE REQUEST: Funding is required to continue the development of batteries with higher energy densities and that are suitable for lower temperature and higher gravity force (G) applications. The development of fuel cell components for 3.0kW and 5.0kW members of the family of silent, lightweight, tactical power sources will continue. In addition, effort will be committed to the development of power conditioning devices to provide the required type and quality of power from various sources.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FT 1981	PY 1982	FY 1983	Additional To Completion	Total E, timated Cost
RDTR Funds (current requirements) Funds (as shown in FY 1982	3052	5072	2998	Continuing	Not Applicable
submission)	3878	5085	3260	Continuing	Not Applicable

DGIO - In FY 1981 the \$14 thousand increase in funding was required for additional development effort to overcome minor unforeseen technical difficulties with the lithium batteries. The decrease of \$4 thousand in the FY 1982 funding level is a result of the amended budget request and the application of revised inflation indices. The decrease of \$35 thousand in estimated funding in FY 1983 results from application of revised inflation indices.

DGI1 - The reduction of \$840 thousand in FY 1981 funding was the result of Army reprograming to higher priority requirements. In FY 1982, the decrease of \$9 thousand is a result of the amended budget request and the application of revised inflation and civilian pay indices. The \$227 thousand reduction in FY 1983 funding is due to program realignment to reflect revised Army priorities.

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

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Program Element: #6.37.02.A

DOD Mission Area: #215 - Land Warfare Support

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

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objectives of this program are to develop technologies and conduct feasibility demonstrations as prerequisites for Engineering Development (ED) of new and improved tactical military electric power sources. The projects encompass efforts on engine-driven power generation (electromechanical power), fuel cells and batteries (electrochemical power), and other power-related devices and associated technology to improve efficiency, type, and quality of power required to support Army tactical systems. Power requirements range from very low outputs (milliwatts) to moderately high outputs (hundreds of kilowatts). To satisfy low power demands, new types of batteries are being developed which will provide higher energy densities, longer storage life, operate over wider temperature ranges, and are better configured to support system requirements than present equivalent capacity batteries. Higher power needs will be met by the latest state-of-the-art engine-driven generators and fuel cells with emphasis on meeting Army tactical requirements and Department of Defense goals for the standardization of power generation equipment to achieve benefits of component commonality, reduced logistics support requirements, lower life-cycle costs, and improved fuel economy.
- G. (U) RELATED ACTIVITIES: In order to preclude a duplication of effort, the Army maintains continuing coordination with the other Services, the Department of Energy, the National Aeronautics and Space Administration, the Department of Health and Human Services, and the Department of Transportation through the Interagency Advanced Power Group and the Department of Defense Project Manager for Mobile Electric Power. The Power Sources Conference sponsored by the US Army Electronics Research and Development Command provides a forum for exchange of information between government, academic, and industrial researchers. Additionally, the Joint Deputies for Laboratories (Panel for Batteries and Puel Cells) assures coordination between the Services on programs concerning battery and fuel cell systems. Advanced Development items in this program element programs to Engineering Development in Program Element 6.47.16.A, Tactical Electric Power Sources. Related basic research is conducted in Program Element 6.11.02.A, Defense Research Sciences, Project AH47, Electronic Devices Research, and Project AH51, Combat Support. Exploratory Development is conducted in Program Element 6.27.33.A, Mobility Equipment Technology.
- H. (U) WORK PERFORMED BY: In-house work is performed by the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA, and the US Army Electronics Research and Development Command, Fort Hommouth, NJ. Five development contracts are in effect with the following firms: Energy Research, Danbury, CT, Solar Turbine International, San Diego, CA, Gulton Industries, Hawthorne, CA; Westinghouse Electric Co, Lima, OH, and Helionetics, Irvine, CA.

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Program Element: #6.37.02.A

DOD Mission Area: #215 - Land Warfare Support

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

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: First-generation moderately high-rate lithium dioxide batteries have been configured for night vision devices requiring high energy. Advanced development was completed on the 2.5 kilowatt (kW) DC-to-DC converter/regulator for digital equipment precision power subsystems. Advanced development continued on the 3 and 5kW methanol fuel cell components and on the improvement of the gas turbine power generation technology.
- 2. (U) FY 1982 Program: Advanced development of the lithium flat cell battery will continue. Initial designs of second-generation lithium cells (with 50% increased energy density) will be configured in flat cell structures and evaluated in the high-stress environments of artillery-delivered sensors and jammers. Development effort on the 3.0 and 5.0kW meth-anol fuel cells will continue. The improvements being developed for gas turbine power generation systems are scheduled to be completed. Fabrication of the 3.0kW methanol fuel cell development test units will be completed and Development Test I (DT I) will be initiated.
- 3. (U) FY 1983 Planned Program: The development of second-generation lithium battery designs will continue. Lithium batteries will be acquired for laboratory testing and for testing with laser target designation equipment. The flat cell designs will be incorporated into battery structures and tested in a simulated high-gravity force environment. Fabrication of the 3.0kW methanol fuel cell (MFC) test units for Operational Test I (OT I) will be completed, and OT I will be initiated upon completion of DT I. Advanced development of the 5.0kW MFC will continue. The 15kW power conditioner will begin advanced development. This unit is the first of a family of power conditioners to be developed for frequency and voltage conversions that provide additional operational capabilities such as using foreign power sources for US Army needs.
- 4. (U) FY 1984 Planned Program: Advanced development of the lithium primary battery for high-gravity force (G) applications will continue. Laboratory testing of the second-generation lithium battery for laser target designators and night vision equipment is scheduled to be completed, and user evaluation of these batteries will be initiated. The 3kW methanol fuel cell is scheduled to complete advanced development. Advanced development will continue on the 5kW methanol fuel cell and the precision power processors for battlefield command and control systems and on the power conditioner family. The 10kW methanol fuel cell and the adiabatic reformer, to provide a multifuel capability for the methanol fuel cell family, will begin advanced development.

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Program Blement: #6.37.02.A
DOD Mission Area: #215 - Land Warfare Support

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

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

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.05.A

DOD Mission Area: #215 - Land Warfare Support

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

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 2269	FY 1982 Estimate 3813	FY 1983 Estimate 5452	FY 1994 Estimate 6897	Additional To Completion Continuing	Total Estimated Costs Continuing
DK82	Physical Security	2269	3813	5452	6897	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program element is to conduct advanced development of physical security equipment used to provide protection for critical areas, installations, the rear area of deployed forces, and items in transit. 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 1983 RDTE REQUEST:

1. (U) Funds are required to accomplish advanced development of components to provide additional capabilities for the Facility Intrusion Detection System (FIDS) in full-scale development under Program Element 6.47.18.A. Physical Security. Advanced development wil: continue on the following FIDS components: sensors, processors, data and surveillance links, and response devices. Advanced development will be initiated for an interior physical barrier.

Major Milestones

Current Milestone Dates Milestone Dates Shown in FY 1982 Submission

Special In-Process Review - Electronic Alerting System Lighting & Barrier Systems

3Q82*

2081

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Program Element: #6.37.05.A

DOD Mission Area: #215 - Land Warfare Support

Title: Physical Security
Budget Activity: 44 - Tactical Programs

Major Milestones

Current Milestone Dates

Milestone Dates Shown in FY 1982 Submission

Validation In-Process Review Advanced FIDS Tagged Material Detector and Covert Duress Sensor (originally Group II) and Containers

4Q81

Validation In-Process Review Advanced FIDS Radio Frequency Motion Sensor (originally Group III)

3Q83

1082**

FY83

- * Delayed until tests at European sites are completed.
- ** Validation In-Process Review to be reconvened 1Q82 to invite participation in decision by Navy and Air Force.
- D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	2269	381 3	5452	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	3072	3822	5556	Continuing	Not Applicable

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Program Element: #6.37.05.A

DOD Mission Area: #215 - Land Warfare Support

Title: Physical Security

Budget Activity: #4 - Tactical Programs

In FY81 funds were reprogramed to 6.47.18.A to fund a cost growth on the interim FIDS contract. Increase in FY82 reflects anticipated inflation and civilian pay index adjustments. Reduction in FY83 is due to reprograming to higher priority areas.

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

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Program Element: #6.37.05.A DOD Mission Area: #215 - Land Warfare Support Title: Physical Security
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Developments will be directed towards satisfying the Army, Air Force, and Navy material need for an interior security system (Facility Intrusion Detection System (FIDS)) and their requirement for a Physical Security Lighting and Barrier System, Rear Area Security Systems, Weapons Access Denial, Transit Security, and Locks, Safes, and Containers. Development will include the following: (1) sensors, including penetration, motion, item removal, duress, and contraband; (2) electronic and fiber optic 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 security equipment and locking hardware; (8) exterior lighting and barrier systems; and (9) weapon access denial. 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) (memo of 26 July 1979) for the Army to "develop the command, control, and Lisplay subsystem (CCDS) of the DOD 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 as well as those items that might be developed by other government agencies.

G. (U) RELATED ACTIVITIES: The exploratory development for physical security equipment is conducted under PE 6.27.33.A, project AH2O, Mobility Equipment Technology, and Defense Nuclear Agency Task B990AXRF/Technology Development. The improved processing technique effort and the fiber optic data link, which entered advanced development in FY8O, are outgrowths of these projects. This program supports the engineering development Program Element 6.47.18.A, Physical Security, in which the major item is the Interim Facility Intrusion Detection System (FIDS). Related are the Army's Remotely Monitored Battlefield Sensor System (REMBASS) tactical sensor program and the Air Force's Base and Installation Security System (RISS) exterior physical security program. Cluse 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 joint working groups and 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's single point of contact is the Product Manager for Physical Security Equipment (PMPSE), who monitors and coordinates the development, acquisition, integrated 'ogistic support, and installation of physical security systems.

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Program Element: #6.37.05.A

DOD Mission Area: #215 - Land Warfare Support

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

H. (U) WORK PERFORMED BY: The United States (US) Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA, is assigned responsibility for Physical Security Research, Development, Test and Evaluation (RDTE). Other government agencies currently involved are the US Army Test and Evaluation Command, Aberdeen, MD. Major contractors are E-Systems, Melpar Div., Arlington, VA; Southwest Research, San Antonio, TX; Tetra Tech, Incorporated, Pasadena, CA; and ENSCO Incorporated, Springfield, VA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments:

a. (U) Facility Intrusion Detection System: Advanced development in pursuance of the approved Materiel Need for the Facility Intrusion Detection System (FIDS) was initiated during FY 1974 under Program Element (PE) 6.37.19.A, Special Purpose Detectors. During FY79 an Acquisition Plan was prepared and a Validation In-Process Review approved entering into full-scale development of Advanced FIDS Group I components. Advanced Development was initiated and contracts were awarded for Advanced FIDS Group II components. During FY80, advanced development (AD) continued for Advanced FIDS Group II components and the Radio Prequency Data Link. AD was initiated for a strain sensor, the Radio Frequency motion sensor, improved signal-processing techniques, a response device and secure fiber optic links. During FY81 AD continued for the components referenced in FY80, and coordination was initiated with the Air Force and Canadian government for a joint US/Canadian effort to evaluate the short ported coaxial cable sensor for interior applications.

b. (U) Security Lighting and Barriers System: During FY77 a review of Commander in Chief, Europe (CINCEUR), lighting requirements was conducted, concentrating on horizontal and vertical illumination requirements 30 feet from the perimeter fence, quick start-up (5" second) lights and noninterruptible power sources. In FY78 the lighting and barriers task was begun, and points of contact for lighting were established at the Defense Nuclear Agency (DNA), National Bureau of Standards (NBS), Department of Energy (DDE), Base and Installation Security System Project Office (BISSPO), and Sandia Laboratories. In FY79 contracts were awarded for fence components, luminaires, trailer-mounted light towers, lighting control system, a lighting and barrier composite system analysis program, models of new high-pressure sodium luminaires, personnel barriers, vehicle barriers, contrasting ground covers, and construction of a test site. In FY80, a test site was completed and various lighting systems were evaluated to determine their delay and deterrent characteristics. Contrasting ground covers were installed and evaluated in terms of improving the sentry's target assessment. The Lighting and Barrier programs were discontinued in FY81 due to no requirement document. Work is scheduled to resume in FY84, pred'cated upon the expected receipt of a requirement document in 40FY83.

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Program Element: £6.37.05.A

DOD Mission Area: #215 - Land Warfare Support

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

c. (U) Electronic Alerting System: The Required Operational Capability was validated in Apr 78. Development was authorized in Nov 78. In FY79 a contract was awarded to determine the best approach to meet the ROC. Concurrence with subsequent selection was given by the Joint Working Group in May 80. In Aug 80 the scope of the contract was expanded to assist in configuration definition and coordination. A sire communication survey questionnaire has been sent to the field in order to obtain detailed information on actual site communication lines.

2. (U) FY 1982 Program:

- a. (U) Facility Intrusion Detection System (FIDS): The advanced development contracts for the data acquisition and analysis equipment, strain-sensitive switch, response device, digital signal processor, and the fiber optic links will be modified or incrementally funded and development continued in FY82. Advanced development testing of the Radio Frequency motion sensor will be initiated and continued in FY83. The advanced development models of the response devices will be delivered, installed in a magazine, and will undergo test and evaluation. An investigation of a strain-sensitive cable for use as a combination sensor and secure data link will be initiated. A joint US-Canadian effort will be initiated to evaluate the Short Ported Coaxial Cable Sensor for interior applications. New contracts will be competitively negotiated for the development of a pulsed sensor and improved signal processing.
- b. (U) Electronic Alerting System: J-SIIDS equipment is being modified as required for use in the electronic alerting system. European field tests are planned for the second quarter. A Special In-Process Review (SIPR) will be conducted to present the results of testing, formalize the quantitative requirements, and obtain approval of the planned approach. Since the majority of the equipment is made up of fielded joint service interior intrusion detection system items, it is anticipated that the program will transition directly into the production phase in PY83.
- 3. (U) FY 1983 Planned Program: Facility Intrusion Detection System: A Validation In-Process Review will be conducted for the RF motion sensor which will transition into engineering development. Advanced development of fiber optic security links, response devices, digital signal processor, strain-sensititive switch, short ported coaxial cable sensor, pulsed sensor, improved signal processor, and the strain-sensitive cable as a combination sensor/data link will continue. Advanced development of an interior physical barrier will be initiated. New threat information will be generated and evaluated to identify system or equipment deficiencies. FIDS is a joint Services program covered by DOD Directive 3224.3, which assigns to the Army the responsibility for interior detection systems, physical security lighting systems, and physical security barrier systems.

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Program Element: #6.37.05.A

DOD Mission Area: #215 - Land Warfare Support

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

4. (U) FY 1984 Planned Program:

- a. (U) Facility Intrusion Detection System: A Validation In-Process Review will be conducted for the internal fiber optic data link, strain-sensitive switch, digital signal processor, deterrent system, and the RF data link. These items will transition into Engineering Development. Advanced Development will continue on the fiber optic d ta surveillance links, combination sensor data link, improved signal processing, pulsed sensor, short ported coaxial sensor, and the interior physical barrier.
- b. (U) Security Locks and Containers: This is the first year that Security Locks and Containers is funded. Advanced Development of high-security locking systems for nuclear and chemical storage magazines will be initiated.
- c. (U) Security Lighting and Barriers Systems: This is the first year that Security Lighting and Barriers Systems has been funded since FY80. Advanced Development models of new lighting barrier components and ground covers will be procured for evaluation. The components that significantly improve security will be developed and included in the family of luminaries, barrier components, and ground covers.
- d. (U) Weapon Access Delay System: FY84 is the first year the Weapon Access Delay System is funded. Advanced Development efforts on the Command and Control System (CCS) will be initiated. A contract will be awarded for Advanced Development models of a CCS which will maximize the use of existing FIDS components and subsystems. A Letter of Agreement will be drafted for staffing at the proper level.
- e. (U) Rear Area Physical Security Systems: FY84 is the first year that the Rear Area Physical Security Systems (RAPSS) is funded. Procurement documentation will be prepared for RAPSS components and subsystems making maximum use of FIDS, BISS, and REMBASS components and subsystems and adapting them for Rear Area applications. The contract(s) will be awarded in FY84. A Letter of Agreement will be drafted for staffing at the proper level.
- f. (U) Transit Security: FY84 is the first year that Transit Security is funded. Sandia Laboratories has completed a limited task for the Department of Energy, which developed a nontactical transit security system. The Sandia concepts will be reviewed for merit, and those items that are determined to be applicable will be included in a data base for this effort.

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Program Element: #6.37.05.A

DOD Mission Area: #215 - Land Warfare Support

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

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 threst 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 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.37.06.A

DOD Mission Area: #344 - Tactical Command & Control

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

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

Project		FY 1981	FY 1982	FY 1983	FY 1984	Additional	Total Estimated
Number	<u>Title</u>	Actual	Estimate	Estimate	Estimate	To Completion	Costs
	TOTAL FOR PROGRAM ELEMENT	2902	9469	6146	11020	Continuing	Not Applicable
D243	IFF Developments	402	3585	3160	3436	Continuing	Not Applicable
D297	IFF NATO	2500	5884	2986	7584	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The ability to detect and engage targets has advanced faster than the ability to positively identify them, with the likely result that either weapons will not be used at their maximum range, or high levels of fratricide will occur. This program is directed toward the development of techniques and equipment to identify aircraft and ground combat vehicles with high reliability. Programs include (1) improvement of current Mark XII air defense IFF interrogators and transponders, (2) development of noncooperative IFF signal processors for major Army air defense system (Hawk, Patriot) and combat surveillance systems (AN/APS-94, STARTLE), and (3) development of a new, cooperative IFF system in coordination with NATO, for both air defense and battlefield applications, called the NATO Identification System (NIS). The air defense portion of NIS is referred to as Mark XV, while the ground combat portion is termed Battlefield IFF (BIFF). NIS hardware will be fabricated by US firms, but the hardware will be compatible with NATO systems. Dollars required for Advanced Development demonstration and validation of Mark XV IFF NATO for FY83 are currently being identified.
- C. (U) BASIS FOR FY 1963 RDTE REQUEST: Under IFF developments (D-243), complete contract for the design, fabrication, and demonstration of adaptive null steering antenna concept for aircraft transponders, award a contract to develop a processor for the non-cooperative identification of aircraft with PATRIOT and DIVADS, continue development of non-cooperative IFF techniques to classify and identify ground combat vehicles. Under NATO IFF program (D-297), continue to support the Tri-Service Mark XV Demonstration and Validation phase for air defense applications and complete system definition for battle:ield applications.

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Program Element: # 6.37.06.A

LOD Mission Area: #344 - Tactical Command & Control

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

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1982 Submission
Test MCIFF (noncooperative IFF) for h	awk FY81	PY81
Award Contract, Patriot		
NCIFF Design	FY82	-
Confirm NIS Draft STANAG	FY81	-
Award Contract, Mark XV		
Adv. Dev.	FY82	-
Award Contract, BIFF Adv. Dev.	FY83	FY81

Contract for construction of advanced development models of BIFF has been deferred to FY-83 to allow time for the Army to thoroughly analyze operational requirements for the system before proceeding with hardware.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	2902	9469	6146	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	462	9496	4194	Continuing	Not Applicable

Increase in FY61 funds represents support for NATO 1FF thru reprograming. FY 83 change represents reallocation of funds from lower priority program to support NATO 1FF effort.

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

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Program Element: # 6.37.06.A

DOD Mission Area: #344 - Tactical Command & Control

Title: Identification Friend-or-Foe (IFF) Developments
Budget Activity: 44 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: Projections of future conflicts in Central Europe depict a Warsaw Pact assault involving numerically superior ground and air forces. It is forecast that battle lines will not be clearly drawn and that friendly and enemy ground combat vehicles and aircraft will be intermingled. The battle will be characterized by equipment (weapons and electronics) that is technologically advanced, resulting in devastating firepower delivered at extended ranges. In this scenario, existing methods of identification will be inadequate. The effectiveness of command and control links (if not jammed) will be severely reduced by the intermingling of friendly and enemy forces, while the existing MK XII sir defense 1FF system may suffer from electronic countermeasures. For ground targets, visual observation will not provide capabilities consistent with the ranges of modern target acquisition and weapon systems. For these and other reasons the Under Secretary of Defense Research and Engineering (USDRE) issued a memorandum on 19 January 1979 establishing a Joint Service 1FF Program, with the primary objective being the timely definition and introduction of the NATO Identification System (NIS). Project D297, 1FF NATO, is directed toward participating in this progress to conduct the necessary design and hardware efforts to determine the most cost-effective design, and obtain agreement with our NATO allies. Project D243, IFF Developments, is directed toward developing special signal processing techniques for noncooperative (passive) identification, to enable positive identification of hoatiles and friends with malfunctioning transpondra. Additionally, the US has a significant investment in the current air defense identification system, the Mark II. Project D243 includes the development of improvements to equipment within the system, so that its useful life can be extended to the time when the air defense portion of MIS is ready for implementation.
- G. (U) RELATED ACTIVITIES: The efforts of this program are planned and accomplished in close coordination with the work under P.E. 6.37.25.F, Combat Identification Technology; PE 6.35.15.N, Advanced Identification Techniques; PE 6.32.67.N, NATO Identification System; and PE 6.47.25.F, Combat Identification Systems. The Air Force is the lead service in this Tri-Service effort. Programs are coordinated by the Air Force Systems Program Office (SPO) under the Tri-Service Charter. The Mission Elements Needs Statement (MENS) was approved in October 1980. A Trilateral Nemorandum of Understanding to exchange technical information on the design and development of the NATO Identification System (NIS) was signed in Nay 1980 with the United Kingdom and the Federal Republic of Germany.
- H. (U) WORK PERFORMED BY: Army 1FF activities are managed by the Combat Surveillance and Target Acquisition Laboratory at Ft Hommouth, NJ. The HII Lincoln Laboratory of Lexington, MA, is providing technical expertise to the program. The non-cooperative IFF work for Hawk is being performed by Scope Electronics of Reston, VA. Work on Hark XII improvements has been performed by Hazeltine Corporation of Greenlawn, NY, and Teledyne Electronics of Newbury Park, CA. During FY81, concept design contracts were swarded by the Air Force to three terms; Bendix/Raytheon, ECI/TI, Nageltine/Barris/Hartin Harietta.

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Addition in

Program Element: # 6.37.06.A

BOD Mission Area: #344 - Tactical Command & Control

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

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Investigated the application of an adaptive antenna subsystem for use with the MARK XII and MARK XV to provide an improved antigaming (AJ) capability. Two Noncooperative Identification Friend or Foe (NCIFF) processors have been fabricated and tested in the laboratory for noncooperative identification of aircraft. The processors will be tested with the MATO Working Group. A competitive concept design phase was completed with three teams of contractors.
- 2. (U) FY 1982-1984 Program: A contract award is anticipated for the design/fabrication and demonstration of a novel adaptive null steering antenna concept for aircraft transponders to increase antijaming (A-J) performance. The mon-cooperative IFF (NCIFF) processors for air defense will be improved and field tested with a HAWK system. The feasibility of incorporating the techniques into the PATRIOT and DIVADS will be investigated. The data base of aircraft will be expanded to include helicopters and data at the PATRIOT radar frequency. The development of signal processors for ground vehicle classification and identification will commence. A Defense Systems Acquisition Review Council I (DSARC I) is scheduled for June 1982 to decide whether a demonstration and validation contract can be awarded. Contract award by the Air Force for two or more demonstration and validation contracts is anticipated which will be partially funded from this program element. The system definition of AIS at HIT Lincoln Laboratory will continue. The initial phase of the TRADOC study to determine potential operational utility of the battlefield portion of NIS will be completed. The contract for the design/fabrication and demonstration of the adaptive null steering antenna concept for aircraft transponders will be completed. The aircraft data base collected the previous year will be utilized to develop algorithms for the non-cooperative identification of aircraft with PATRIOT and DIVADS. Fabrication of IFF processor hardware will be initiated. The development of signal processors for ground moving and stationary vehicle classification and identification will continue. Damonstration processors will be fabricated. The contractual effort to fabricate and test NCIFF processors for PATRIOT and DIVADS will be continued. Tests will be conducted with ground vehicle classification and identification processors with selected radars. The fabrication of the HARK XV hardware will be completed and testing initiated. Army funds will provide support to th
 - 3. Program to Completion: This is a continuing program. Future efforts will include completion of development and test of Noncooperative Target Recognition (NCTR) processors--MARK XV, BIFF, and entry into Engineering Development.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D297

Program Element: #6.37.06.A

Title: Identification Friend or Foe NATO

Title: Identification Friend or Foe Developments

DOD Mission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Projections of future conflicts in Central Europe depict a Warsaw Pact assault involving numerically superior ground and air forces. It is forecast that battle lines will not be clearly drawn and that friendly and enemy ground combat vehicles and aircraft will be intermingled. The battle will be characterized by equipment (weapons and electronics) that is technologically advanced, resulting in devastating firepower delivered at extended ranges. In this scenario, existing methods of identification will be inadequate. The effectiveness of command and control links (if not jammed) will be severely reduced by the intermingling of friendly and enemy forces, while the existing Mark XII air defense IFF system may suffer from electronic countermeasures. For ground targets, visual observation will not provide capabilities commensurate with the ranges of modern target acquisition and weapon systems. For these reasons, and the lack of a NATO standardized IFF system, the Under Secretary of Defense for Research and Engineering issued a memo on 19 Jan 79 establishing a Joint Service IFF Program to develop the US Identification System (USIS), with the primary objective being the timely definition and introduction of the NATO Identification System (NIS). Project D297 is directed toward participating in this program to conduct the necessary design and hardware efforts to determine the most cost-effective design, and obtain agreement with our NATO allies.

- B. (U) RELATED ACTIVITIES: The efforts of this program are planned and accomplished in close coordination with the work under PE 6.37.25.F, Combat Identification Technology; PE 6.35.15.N, Advanced Identification Techniques; PE 6.32.67.N, NATO Identification System, and PE 6.47.25.P, Combat Identification Systems. The Air Force is the lead service in the Tri-Service effort. Programs are coordinated by the Air Force Systems Program Office (SPO) under the Tri-Service Charter dated 26 September 1980. The Mission Elements Need Statement (MENS) was signed in October 1980. A trilateral memorandum of understanding to exchange technical information on the design and development of the NATO Identification System (NIS) was signed in May 1980 with the United Kingdom and the Federal Republic of Germany.
- C. (U) WORK PERFORMED BY: Army NATO IFF activities are managed by the Combat Surveillance and Target Acquisition Laboratory at Fort Hormouth, NJ. The Massachusetts Institute of Technology (MIT) Lincoln Laboratory of Laxington, MA, is providing technical expertise to the program.

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Project: #D297

Program Element: #6.37.06.A

Title: Identification Friend or Foe NATO

Title: Identification Friend or Foe Developments

DOD Mission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) Fy 1981 and Prior Accomplishments: A draft Standardization Agreement (STANAG) for the NATO Identification System was confirmed in the NATO Working Group. A competitive concept design phase was completed with three teams of contractors.
- 2. (U) FY 1982-1984 Program: A Defense Systems Acquisition Review Council (DSARC) I is scheduled for March 1982. Contract award by the Air Force for two or more Demonstration and validation contracts is anticipated which will be partially funded from this project. The system definition of NIS at MIT Lincoln Laboratory will continue. The initial phase of the TRADOC study to determine potential operational utility of the battlefield portion of NIS will be completed. The fabrication of the Mark XV Development hardware will be completed and testing initiated. Army funds will provide support to the Tri-Service program. Contract for the battlefield portion of NIS will be awarded if a requirement has been established.
- 3. (U) Program to Completion: This is a continuing program. Puture efforts will include completion of development and test of the Mark XV, BIFF and Non-Cooperative Transporter (NCTR) processors and entry into Engineering Development.
- 4. (U) Major Milestones: NATO IPF program for PY82 includes complete system specification for the air defense applications and award of a contract for advanced development; complete requirements study for battlefield, as well as system definition.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
		
Confirm NIS Draft Standardization Agreement (STANAG)	FY81	FY81
Award Contract, Mark (XV) Adv. Dev.	FY82	FY82
Award Contract, Battlefield Identification	FY84	FY83
Friend or Foe (BIFF) Adv. Dev.		
Award Contract, Adaptive Antenna Concept	FY62	FY82

Contract for construction of advanced development models of BIFF h.s been deferred to FY83 to allow time for the Army to thoroughly analyze operational requirements for the system before proceeding with hardware.

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Project: #D297

Program Element: #6.37.06.A

DOD Hission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

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

RDTE	FY 1981 Actual	PY 1982 Estimate	FY 1983 Estimate	PY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1982	2500	5884	2986	7584	Continuing	Not Applicable
submission)	0	5901	0		Continuing	Not Applicable
Quantities (current requirements) Quantities (as shown in FY 1982	Not Appl:	icable				
submission)	Not Appl:	icable				
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Increase in funding in FY 1981 and FY 1983 was due to Army reprograming from lower priority developments. Decrease in FY82 was a result of applying revised inflation and civilian pay pricing indices.

Other Appropriations: Not Applicable

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.07.A

DOD Mission Area: #345 - Tactical Communications

Title: Communications Development
Budget Activity: 14 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 2989	FY 1982 Estimate 6318	FY 1983 Estimate 8720	FY 1984 Estimate 10260	Additional To Completion Continuing	Total Estimated Costs Not Applicable
D246	Tactical Communications						
	Development	2283	3993	5813	6462	Continuing	Not Applicable
D437	Tactical Rapid Communications	706	2325	2907	3998	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEEDS: This program exploits the most advanced technology of fiber optics, millimeter and microwave transmission characteristics, and microprocessor control of antenna systems, high-frequency radio systems, and signal hiding systems. The program applies the technology to develop working feasibility models for advanced communications systems. Present Army tactical communications systems suffer from a lack of mobility, vulnerability to electronic countermeasures, radio frequency signal congestion, and a lack of signal hiding capability. The objective of this program is to apply the results of exploratory development to overcome existing deficiencies, thereby improving the ability of the Army to perform its mission. Specific areas of exploitation include millimeter wave transmission, fiber optics cable systems, antenna systems, and high-frequency communication systems.

C. (U) BASIS FOR FY 1983 REQUEST: Complete contracts to develop the miniature 26-channel multiplexer for fibre optics (FO), the adaptive high-frequency receiver/transmitter (HFRT), and solid state power amplifier for ultra high-frequency (UHF). start contracts to develop FO wavelength division multiplex System, the mobile intercept resistant radio (MISR), the digital microwave radio (DMR), extended-range missile payout FO system, and a high-power broadband vehicular antenna. Continue development of the quick-erect antenna mast (QEAM). Continue work on interference reduction and start new contracts for miniature very high-frequency (VHF) vehicular antenna and a high-frequency (HF) antenna for mobile short distance and nap-of-the-earth (NOE) applications. Develop commercial/DCA group multiplexer interface to TRI-TAC. Develop microproceasor multiplexer.

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Program Element: #6.37.07.A
DOD Mission Area: #345 - Tactical Communications

Title: Communications Development
Budget Activity: 44 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	2989	6318	8720	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	3986	6336	8870	Continuing	Not Applicable

Funding difference in FY81 is due to late approval of determination and findings to proceed with the high-power VHF amplifier. Differences in FY72 and FY83 are due to revision of inflation estimates.

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

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Program Element: #6.37.07.A

DOD Mission Area: #345 - Tactical Communications

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

- 2. (U) FY 1982 Planned Program: Award contract for 500 watt vhf power amplifier develop, and test. Complete the SLPA and broadband VHF vehicular antenna contracts and conduct evaluation tests. Start internal work to use microprocessors for multiplexer applications.
- 3. (U) FY 1983 Planned Program: Develop miniature 26-channel fibre optic multiplexer. Develop and test the quick-erect antenna mast and transition to 6.4 development. Identify features required to improve the improved high frequency radios. Continue work in interference reduction techniques for data and voice signals over single channel radios. Develop transmission line and VHF multielement antennas, and perform operational tests.
- 4. (U) FY 1984 Planned Program: Start in-house work to define advanced multiplexing techniques. Start development of a High Frequency (HF) and VHF radio system for communications in built-up areas. Award contract for meteor trail and adaptive power/netting appliques for use with VHF single channel radios. Complete contract for microprocessor models. Complete TRI-TAC/DCA interference feasibility models, perform tests and recommend follow-on efforts.
- 5. (U) Program to Completion: This is a continuing program with many individual elements transitioning from Advanced Development to Egnineering Development as they mature.
 - 6. (U) Major Milestones: Not applicable.

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Program Element: #6.37.07.A DOD Mission Area: 1345 - Tactical Communications Title: Communications Development
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKCROUND AND DESCRIPTION: This program provides the bridge between exploratory development and engineering development of high technology communications to satisfy the needs of the Army. Increased survivability of critical command and control communications (C3) will be provided by development of a tactical high power very high frequency (VHF) power amplifier, adaptive VHF technology, and improved signal processing and detection. Major cost reductions will result from development of a small unit transceiver (SUT) which maximizes the use of integrated circuitry and eliminates the use of conventional techniques for signal processing. "Smart" communications which minimize operator intervention, circuit planning, and time required to restore communications by means of alternate routes or links will be provided by developments which utilize the maximum practicable application of microprocessor technology to radio communications for the Army in the field. Application of advanced microprocefsor and signal processing techniques will improve antenna efficiency, performance, and jamresistance. Vulnerability of current and proposed radios to interference and electronic countermeasures creates a need for sophisticated frequency management. An urgent need exists to overcome radio operational deficiencies imposed by present antennas. This program will apply advances in antenna technology and interference reduction techniques to smeliorate these problems. All of these applications have one goal: The massmization of Army communications effectiveness in battle and in peacetime at the minimum cost and complexity.

G. RELATED ACTIVITIES: Program Element 6.11.01.A (Research) and Program Element 6.27.01A (Communications-Electronics) apply research and technology inputs to this element which in turn will apply inputs to Program Element 2.80.10A (Tri-Service Tactical Communications Program); Program Element 6.47.01A (Communications Engineering Development) and Program Element 6.37.23.A (Command Control). Coordination is accomplished by Department of the Army reviews, through exchange of technical reports and attendance at scientific meetings, conferences of both military and civilian activities. There is no unnecessary duplication of effort within Army and DOD.

H. (U) WORK PERFORMED BY: A total of thirteen (13) contracts whose total FY 198" cost is \$5,675,000. In-house work performed by U.S. Army Communications Electronics Command, Ft Monmouth, NJ.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (i) FY 1981 and Prior Accomplishments: Awarded contracts for the survivable low profile antenna (SLPA) and broad-band VHF vehicular antennas. Operational and development tests have been completed on the SLPA. A contract for the VHF high power amplifier was awarded and completed. Contracts were awarded for the zero IF and cross coupled phase locked loop (PLL) for interference reduction techniques. Provided engineering support and evaluation for a family quick erect antenna masts. Completed fibre optic cable system for interconnection of AN/TYC-39 shelters. Started contracts to develop fibre optic cable payout system, fibre optic distribution system, and millimeter-wave command post radios.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # D246 Program Element: # 6.37.07.A

DOD Mission Area: #345 - Tactical Communications

Title: Tactical Communications Systems Development
Title: Communication-Development

Budget Activity: #4 - Tactical Program

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: This program provides the bridge between exploratory development and engineering development of high-technology communications to satisfy the needs of the Army. Increased survivability of critical command and control communications will be provided by development of a tactical high-power very high frequency (VHF) power amplifier, adaptive VHF technology, and improved signal processing and detection. Major cost reductions will result from development of a small-unit transceiver (SUT) which maximizes the use of integrated circuitry and eliminates the use of conventional techniques for signal processing. "Smart" communications which minimize operator intervention, circuit planning, and time required to restore communications by means of alternate routes or links will be provided by developments which utilize the maximum practicable application of microprocessor technology to radio communications for the Army in the field. Application of advanced microprocessor and signal processing techniques will improve antenna efficiency, performance, and jam-resistance. All of these applications have one goal: the maximization of Army communications effectiveness in battle and in peacetime at the minimum cost and complexity.
- B. (U) REIATED ACTIVITIES: Program Element #6.11.01.4 (Research) and Program Element #6.27.01A

 (Communications-Electronics) apply research and technology inputs to this element which in turn will apply inputs to Program Element #2.80.10A (Tri-Service Tactical Communications Program); Program Element #6.47.01.4 (Communications Engineering Development) and Program Element #6.37.23.4 (Command Control). Coordination is accomplished by Department of the Army reviews, through exchange of technical reports and attendance at scientific meetings and conferences of both military and civilian activities. There is no unnecessary duplication of effort within the Army and DOD.
- C. (U) WORK PERFORMED BY: A total of seven contracts whose total FY 1983 cost is \$2,225,000. In-house work is performed by the US Army Communications Electronics Command, Pt Mormouth, NJ.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Frior Accomplishments: Awarded contracts for the Survivable Low Profile Antenna (SLPA) and Broadband Very High Frequency (VHF) Vehicular Antennas. Operational and development tests have been completed on the SLPA. A contract for the VHF High Power Amplifier was awarded and completed. Contracts were awarded for the Zero IF and Cross Coupled Phase Locked Loop (PLL) for interference reduction techniques. Provided engineering support and evaluation for a family of Quick-Erect Antenna Masts (moved to Project #D246 in FY 1982).

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Project: # D246
Program Element: # 6.37.07.A

DOD Mission Area: #345 - Tactical Communications

Title: Tactical Communications Systems Development

Title: Communication-Development

Budget Activity: #4 - Tactical Program

2. (U) FY 1982 Program: Award contract for 500-watt VHF Power Amplifier, develop, and test. Complete the SLPA and Broadband (VHF) vehicular antenna contracts and conduct evaluation tests. Start internal work to use microprocessors for multiplexer applications. Define and analyze Defense Communications Agency (DCA) and TRI-TAC interoperability system requirements and start contract to prepare preliminary design plan and generate input/output channel models.

- 3. (U) FY 1983 Planned Program: Continue the work on interference reduction techniques for data and voice signals over single-channel radios. Evaluate performance of cross-coupled phase-locked loops (PLL) and award a contract for second development phase of the small-unit transceiver signal detection scheme. Develop transmission line and Very High Frequency (VHF) multielement antennas, and perform operational tests.
- 4. (U) FY 1984 Planned Program: Selected candidate for microprocessor implementation in multiplexers and award contract for advanced development model. Start in-house work to define advanced multiplexing techniques. Start development of an HF and VHF rad o system for communication in built-up areas. Award contract for meteor trail and adaptive power/netting appliques for use with VHF single-channel radios (SINCGARS). Complete contract for microprocessor models. Complete TRI-TAC/DCA Interference Feasibility models, perform tests, and recommend follow-on effort.
- 5. (U) Program to Completion: This is a continuing program with many individual elements transitioning to 6.3B, Advanced Development, and to 6.4, Engineering Development, as they mature.
 - 6. (U) Major Milestones: Not applicable.
 - 7. (U) Resources (\$ in thousands):

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	2283	3993	5813	6897	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	2133	4005	4959	-	Continuing	Not Applicable

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Project: # D246
Program Element: # 6.37.07.A
DOD Mission Area: #345-Tactical Communications

Title: Tactical Communications Systems Development
Title: Communication-Development
Budget Activity: #4 - Tactical Program

Funding changes from the FY 1981 and FY 1982 submission are a result of inflation adjustment. FY 1983 increase will support the shelter-to-shelter fiber optic program to replace the standard bulky 26-pair cable.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.11.A
DOD Mission Area: #371 - Self Protection

Title: Aircraft Survivability Equipment (ASE)
Rudget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 3582	Fy 1982 Estimate 12162	FY 1983 Estimate 3563	FY 1984 Estimate 25516	Additional to Completion Continuing	Total Estimated Cost Not Applicable
	QUANTITIES					Continuing	Not Applicable
D653	Aircraft Survivability Equipment	3582	12162	3563	25516	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program includes the advanced development efforts to provide US and allied aircraft with self protection against enemy infrared radar, optical/electro-optical and laser air defense threats. The program is the continuation of efforts to achieve the survivability and enhanced combat effectiveness required to accomplish the Army attack, assault, and special electronic mission aircraft (SEMA) mission requirements. The program is structured to preclude aervice duplication as it reflects the Army's responsibility for the implementation of a Tri-service Memorandum of Agreement reached in 1977. The MOA gives the Army the responsibility for developing/procuring ASE associated with helicopters and small "low-performance" fixed wing aircraft. This program responds to the Required Operational Capability (ROC) for Aircraft Survivability Equipment (ASE). ASE is needed for both currently fielded and future Army aircraft in order to survive to accomplish combat missions and reduce combat attrition to acceptable levels.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: FYR3 funds are required for advanced developments which address the current and future threat to Army aviation presented by the SA-4/4A, SA-7, SA-8, SA-9, SA-11, SA-12, SA-13, SA-14, SAMs, future variants of the ZSU-23-4 and its follow-on and laser threats. The three most serious threats are presented by air defense fire control systems employing (1) TV and optical systems which enhance low-slittede kill capability, (2) radars operating at millimeter wave frequencies, and (3) radars employing monopulse and pulse doppler signal processing. The FY83 program completes and/or transitions major hardware thrusts to develop millimeter wave and monopulse countermeasures improvements for technical insertion into current ASE radar warning (AN/APR-39) and imming (AN/AQ-136) systems.

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Program Element: #6.37.11.A

DOD Mission Area: 371 - Self Protection

Title: Aircraft Survivability Equipment (ASE)
Budget Activity: \$4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	3582	12162	3563	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	7134	12197	20103	Continuing	Not Applicable

FY81-83 decrease due to reprograming to higher priority Army requirements and application of inflationary index.

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

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Program Element: #6.37.11.A

DOD Mission Area: 371 - Self Protection

Title: Aircraft Survivability Equipment (ASE)
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Starting in FY83, the two Advanced Development (AD) projects, (DB52 Scout/Attack Helicopter Survivability Equipment, and D653, SEMA Survivability Equipment) managed by the Army Project Manager for ASE (PM-ASE) are combined. This was done because of the close similarity between the technical aspects of these two projects. Therefore, only one Project, D653, (Retitled; Aircraft Survivability Equipment) will be identified to PE 6.37.11.A. The objective of this project is the development and concept fessibility demonstration of countermeasure systems required for the protection of special electronic mission aircraft (SEMA) and tactical combat/utility helicopters in a hostile air defense environment composed of radar, infrared, and optically/eletroptically directed weapon systems. The approach includes the determination of ASE system requirements and specifications for development using TRADOC battlefield scenarios, approved threats and DARCOM candidate equipments. The equipments selected for development are those with the greatest potential to significantly enhance the staying power and combat effectiveness of the sircraft in a cost and penalty effective manner. ASE techniques include signature reduction, threat warning and imming, and decoy equipments as well as the ballistic hardening of sircraft components. Also covered are the development of measuring and evaluation techniques and equipments and necessary program management support to the ASE program. Foreign state-of-the-art survivability equipment and threat intelligence is considered and applied throughout the project. In 1972, the SA-7 was used against Army helicopters in Vietnam, and in response, Army helicopters were quickly equipped with IR suppressors and low-reflectance paint. The success of these signature reduction items provided credible evidence of the tactical ability of helicopters to operate against sophisticated surface-to-air-missiles. This success, coupled with demonstrations of the ability to jam advanced IR threat missiles, and the development of a successful, low cost radar warning receiver formed the nucleus of the ASE program. In 1973 a joint US Army Training and Doctrine Command/US Army Materiel Development and Readiness Command (TRADOC/DARCOM) Working Group was formed to determine requirements for ASE and address current and future threats to Army sviation. An extensive analysis of the survivability of Army aircraft in their major combat scenarios with and without At was performed. The analysis provided survivability benefits as a function of cost, penalty, and development risk which led) the development of specific system requirements for ASE to address the IR, radar, and optical threats. As a result of this analysis performed by the Joint Working Group, the tasks within this program were defined and the ROC for ASE was prepared. Periodic updates maintain a viable program to address the changing and increasingly sophisticated air defense threat.

G. (U) <u>RELATED ACTIVITIES</u>: This program is conducted in conjunction with PE 6.47.11.A, Aircraft Electronic Warfare (EW) Self-Protection System, also managed by the Project Manager for Aircraft Survivability Equipment (PM-ASE), and PE 6.32.15.A, John Survivability Investigations, of which PM-ASE is the Senior Army Representative. In 1977, the Services signed a Memorandum of Agreement outlining the responsibilities for tri-Service development and production of the aircraft EW self-protection (AEWSP) systems for helicopters and selected fixed-wing aircraft. The Army is responsible for radar and

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Program Element: #6.37.11.A DOD Mission Area: 371 - Self Protection Title: Aircraft Survivability Equipment (ASE)
Budget Activity: 64 - Tactical Programs

laser warning receivers for most helicopters and selected fixed-wing aircraft, radar lammers for attack and other selected helicopters/fixed-wing aircraft, infrared (IR) jammers for small helicopters and designated low/slow fixed-wing aircraft, and pulse doppler miss'le warning detectors for helicopters and selected fixed-wing aircraft. The Navy is responsible for IR jammers for large helicopters, continuous wave (CW) radar jammers for selected Navy aircraft and Army special electronic mission mistraft (SEMA), and ultraviolet (UV) missile warning detectors for selected helicopters and fixed-wing mission mistraft and selected helicopters. International coordination is achieved through North Atlantic Treaty Organization (NATO) NATO Army Armaments Group (NAAG), and Quadripartite Working Groups.

H. (U) <u>MORK PERFORMED BY</u>: US Army Aviation Research and Development Command (AVRADCOM), St. Louis, NO; US Army Electronics Research and Development Command (ERADCOM), Electronic Warfare Laboratory (EWL), Ft Monmouth, NJ; US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. Contractors: Sanders Associates, Inc., Nashua, NR; ITT Corporation, Nucley, NJ; TRACOR, Inc., Austin, TX; Hughes Helicopter, Culver City, CA; Calspan Corporation, Burialo, NY; Perkin Elmer, Norwalk, CT; Applied Technology, Inc., Mountain View, CA; Tasker Systems, Chatsworth, CA; Hartin Marietta, Orlando. FL; Hughes Aircraft, Culver City, CA; Honeywell Inc., Lexington, MN; Bell Helicopter, Hurst, TX.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: In 1976, improved versions of the infrared (IR) suppressors, used to defeat the SA-7 missile in the Republic of Vietnam, were fielded to frontline US tactical aircraft in Germany, Kores, and the United States. Advanced Development (AD) was completed, and engineering development (ED) was initiated for IR suppressors for prouth threats on the following aircraft: OH-58 (FY 1975), OV-1 NOHANK (FY 1975), AR-1 COBRA (FY 1977), and RU-21 GUARDRAIL (FY 1977). Infrared jammers applicable to attack, observation, and utility helicopters, including AH-64 APACHE and UH-60 BLACKHAWA, completed AD in FY 1976. A pulse doppler missile detector, AN/ALQ-136 for the AR-1 COBRA completed advanced development (AD) in FY 1977. An advanced radar warning receiver, APR-39(V)2 for special electronic mission aircraft (SEMA), completed AD in FY 1976 as did a dual-purpose chaff and flare dispenser and tactical aircraft radar jammer. An optically designed flat plate canopy, which reduced sun glint, entered engineering development (ED) in 1975 for the AR-1 and OH-58 aircraft. An improved light shade of infrared (IR) paint modeled after an Air Force development began ED in 1977 for SEMA. AD of the optical warning location/detection (OWL/D) system started in 1976 and continuous wave radar jammer for SEMA aircraft. Developments of countermeasures against millimeter wave radars were initiated with the development of a

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Progress Element: #6.37.11.A

DOD Hission Area: 371 - Self Protection

Title: Aircraft Survivability Equipment (ASE)
Budget Activity: #4 - Tactical Programs

millimeter wave capability for the APR-39 radar warning receiver (RWR). A feasibility study of USN/USAF advanced self-protection radar immmer (ASPJ) was initiated to assess suitability/adaptability for Army use. Self-Protection Radar Jammer (ASPJ) was initiated to assess suitability/adaptability for Army use. Army participation in a Tri-Service development and test program was initiated to define technology and hardware modifications to upgrade Aircraft Survivability Equipment with monopulse capabilities. Development and flight testing of the tri-service AN/AAR-XX ultraviolet missile detector were completed during FY80. Infrared signature measurements of the sauppressed AH-1S and UN-60A were completed during FY80. Advanced development of AH-1S fire-retardant system for in-flight fuel fires was completed during FY81. Development efforts were initiated for millimeter wave frequency extension of the AN/ALQ-136 radar jammer in 1980, and continued in 1981. FY81 accomplishments included continued development of millimeter submodule and preparation for contract award for design of DRFM modification for AT (Advanced Threat) ALQ-136 radar jammer; contract award for design of AI (Air-Intercept) modifications for AT ALQ-136 radar issuer for SEMA aircraft; MM (Millimeter) chaff measurements/tests and contract award for design of M-130 smart dispenser for multiple decoys; development of endurance testing techniques for application to MACKHAWK hover IR suppressor subsystem project; continued development of SAVIM generic fuel tank nitrogen inerting module; completion of test data reduction and preparation for validation in-process review for the ALQ-156 missile detector application to SEMA; design and test of multiband receiver for application to AT APR-39 for SEMA aircraft; design and test of brassboard nonpulse RF (Radio Frequency) expendable radar jammer; continued design and test of millimeter wave modifications to APR-39(V)1 for application to AT APR-39 RWR (Radar Warning Receiver) for tactical aircraft; conduct of systems engineering analysis in support of ASE Permanent Steering Group (PSG) for definition of future ASE system requirements.

- 2. (U) FY 1982 Program: FY 1982 program continues system requirements development for high pulse rate pulse doppler receiver and interferometer modification for application to AT APR-39 RWR to counter known threat. The design and development of a monopulse submodule will continue for the AT ALQ-136 radar jammer with application to both SEMA and tactical helicopters. Development of digital RF memory and millimeter jammer modules for tactical helicopters will be continued and DT/OT I tests conducted. Design and development of SAVIM modules will be completed and applied to AH-1S and AH-64 sircraft.
- 3. (U) FY 1983 Planned Program: Program plan continues development and design efforts for the AT APR-39 RWR for SEMA sircraft. DT/OT I will be completed, data analysis performed and specifications prepared to enter engineering development for the AT ALQ-136 radar jammer for tactical sircraft. A significantly larger FY83 effort had been planned but funds were decremented for higher priority Army projects.

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Program Element: #6.37.11.A

DOD Mission Area: 371 - Self Protection

Title: Aircraft Survivability Equipment (ASE)
Budget Activity: #4 - Tactical Programs

- 4. (U) FY 1984 Planned Program: DT/OT I of AT APR-39 for SEMA will be completed and validation IFR conducted. Integration of cockpit control and display systems will be initiated, designed and developed for selected fixed and rotary wing Army aircraft to reduce required panel space and improve human factor design. Initiate design and develop integrated test sets to eliminate multiple test sets. Conduct ASE operational test and evaluation of SEMA aircraft in conjunction with TRADOC to verify ASE system and tactical effectiveness consisting of simulations, one on one field experiments and force on force tests. Initiate development of the anti-tank guided missile (ATGM) Jammer and the AT AVR-2 to add direction finding and CO₂ laser response to AN/AVR-2 LWR (Laser Warning Receiver). Develop RF countermeasures to reduce radar cross section of aircraft skins and rotating components for application to fixed and rotary wing aircraft. Initiate development of advanced 8-14 micron IR Expendables for defeat of forward looking infrared (FLIR) systems and AI infrared search/track sets. Modifications to GRETA (Ground Radar Emetter for Training Avistors) radar to incorporate a Millimeter Wave (NHW) training capability and improve low altitude clutter capability via moving target indicator (MTI) and/or pulse doppler techniques will be initiated. In addition, initiate development of CW radar and FLIR sensor and add as modifications to GRETA for testing and training with the AN/ALQ-169 optical warning receiver. Initiate development of classroom trainer for ASE to include warning receivers and jammers. Competitive contract will be awarded for the design and development of the AN/ALQ-169 (OWL/D) for the AH-1S and AH-64.
- 5. (U) Program to Completion: This is a continuing program. The aircraft survivability equipment advanced development program responds 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) with broad representation from the US Army Training and Doctrine Command (TRADOC) and US Army Materiel Development and Readiness Command (DARCOM). Interservice review is accomplished in accordance with the triservice Memorandum of Agreement by the Joint Yachnical Coordinating Group on Aircraft Survivability (JTCG/AS).

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.13.A DOD Mission Area: #343 - Theater Communications Title: Army Data Distribution System (Formerly JTIDS)
Budget Activity: \$4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 15792	FY 1982 Estimate 18664	FY 1983 Estimate 32886	FY 1984 Estimate 19657	Additional To Completion Continuing	Estimated Costs Not Applicable
D370	PLRS/JTIDS Hybrid (PJH)	15792	18664	32886	19657	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Emerging automated battlefield systems require realtime, jam-resistant data communications. Current systems used for this program are limited by restricted data handling capacity, EW vulnerability, voice/data contention problems, a lack of adequate automatic relay capabilities, and poor mobility. The PLRS/JTIDS Hybrid (PJH) will modify, combine, and integrate components of two systems presently under development, the Position location Reporting System (PLRS), and the Joint Tactical Information Distribition System (JTIDS). By taking advantage of the advanced state of development of these two projects, it will be possible to produce an integrated and synergistic system to satisfy the Army's stated data distribution requirements and overcome existing deficiencies earlier than would otherwise be possible. Without this program the Army's automated systems will have limited effectiveness in an electronic combat environment on the mobile battlefield of the future. The PJH system will support data communications requirements in the five functional areas of maneuver control, fire support, air defense, intelligence/electronic warfare, and combat service support. Development work is being carried out in a flexible five-phase program.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Funds requested in FY83 are required to complete contract Phase 3 and start contract Phase 4 (objectives shown following), obtain and supply government-furnished equipment for contractor's use in the testbed and continue government in-house support. Phase 3 Objectives: Validate PJH User Unit Design, enhance User Unit COMSEC, demonstrate tactical scenarios with contractor testbed and assess Net Control Unit operations (net management). Phase 4 Objectives: Continue/complete tactical scenario work as necessary and prepare for prototype system field excercises at selected Army sites.

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Program Element: #6.37.13.A

DOD Mission Area: #343 - Theater Communications

Title: Army Data Distribution System (Formerly JTIDS)
Budget Activity: #4 - Tactical Programs

	Current	Milestone Dates
Major Milestones (Start)	Milestone Dates	Shown in PY 1982 Submission
Definition/Evaluation (Phase 1)	Iul 1979	None Shown
PLRS/JTIDS Interface/Interopera-		
bility (Phase 2)	Jun 1980	
Interface with Other Systems		
(Phase 3)	Mar 1982	
Initial Prototype Evaluation		
(Phase 4)	10FY83	
Full Prototype Evaluation		
(Phase 5)	10FY84	
ASARC 111	40 FY86	
First Unit Equipped	40FY86	

Completion date for the PJH program has not changed appreciably since initiation. Phase dates have been adjusted over time, however, to reflect technical evolution of the program. Further adjustment, for consolidation of the later phases, is possible following evaluation of the contractor's proposals beyond Phase 2.

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Program Element: #6.37.13.A DOD Mission Area: #343 - Theater Communications Title: Army Data Distribution System (Formerly JTIDS)
Budget Activity: 44 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	PY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	15972	18664	32886	Continuing	Not Applicable
submission)	17364	18722	41333	36153	113572

Changes in FY81-83 result from service reprograming to higher priority requirements. Change to a continuing program reflects anticipated funding requirements beyond POM years, FY83-87.

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

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Program Element: #6.37.13.A

DOD Mission Area: #343 - Theater Communications

Title: Army Data Distribution System (Formerly JTIDS)
Budget Activity: #4 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: The Army Data Distribution System, or PJH, is an integration of two full-scale development programs, the Position Location Reporting System (PLRS) and the Joint Tactical Information Distribution System (JTIDS). The program was initiated by the Army in recognition of the potential of merging PLRS and JTIDS to meet critical operational needs for improvement of data distribution (and position location/reporting) in support of automated Army systems on the battlefield. PJH will satisfy this requirement for realtime data distribution, navigation, and identification. The heart of the system is the Net Control Unit (NCU) which performs net management and control functions. There will be five NCUs in a typical deployed division. Enhanced PLRS user units (EPUU) will be furnished users that have limited data requirements in forward areas of the division, while JTIDS class 2 terminals will be used to pass higher volume data requirements associated with equipment such as TACFIRE and the AN/TSO-73. Without this data communications system, highly sophisticated weapons system will not operate to their full potential, and the Air Defense community, in particular, will not have a responsive means of providing early warning, cueing, aircraft identification, and weapons command/control information among their component systems.
- G. (U) RELATED ACTIVITIES: PE 6.37.13.A, Communications Development, Project D137, Joint Tactical Information Distribution System (JTIDS), accomplished the Phase I concept definition and evaluation for the PJH program in FY80/81. The current Project, D370, under this PE was established in FY81. The Position Location Reporting System (PLRS), PE 6.47.27.A, Project DC98, and Army Support of JTIDS, PE 6.47.02.A, Project D451, are related programs.
- H. (U) WORK PERFORMED BY: Management by PM PLRS/TIDS, Ft. Monmouth, NJ. In-house developing agencies are the US Army Communications and Electronics Command (USACECOM) Ft. Monmouth, NJ, and elements of the US Army Electronics Research and Development Command (USAERADCOM) at Ft. Monmouth, NJ. Contractual efforts are provided by MITRE Corporation, Bedford, MA; Hughes Aircraft Company (Ground Systems Group), Fullerton, CA; and the Singer Co. (Kearfott Division), Little Falls, NJ.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: Efforts began in FY 1980 under PE 6.37.13.A, Project D137 JTIDS. A Letter of Agreement (LOA) between the combat and material developers was approved by the Department of the Army on 9 July 1979. On 8 August 1979, the Office of the Secretary of Defense authorized the Army to proceed with the PJH development. The program is being carried out in a series of evolutionary developments and test phases. Integral to each phase is a test period to verify program development activities to date. The establishment of a PJH testbed was initiated in FY 1981 for purposes of integrating engineering development models of PLRS and JTIDS equipment. Continuation of testbed activities in FY 1982 will carry over to FY 1983, when interface testing with potential host systems will take place. FY 1984-86

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Program Element: #6.37.13.A

DOD Mission Area: #343 - Theater Communications

Title: Army Data Distribution System (Formerly JTIDS)
Budget Activity: #4 - Tactical Programs

activities will lead to final system test and evaluation when a full prototype system will be exercised with a representative combat division.

- 1. (U) FY 1981 and Prior Accomplishments: During FY 80 the Hughes Aircraft Company, (HAC) completed the Definition and Evaluation of the ADDS System (Phase I). HAC also developed the design concept and analyzed division-level data need lines to determine if the concept would satisfy the Army's distribution requirements. Results of the HAC effort supported establishment of the development testbed, Phase 2 of the program, which was initiated in July 1980. Phase 2 will verify the interoperability of PLRS and JTIDS by exchanging data between the two systems. To do this, the initial testbed will include fourteen PLRS User Units, a PLRS Master Unit, five JTIDS Class 2 terminals and appropriate interfaces to allow a suitable representation of the PJH system to be achieved. To illustrate battlefield operations, scenarios approved by various Army users will be exercised initially near the completion of Phase 2 in early 1982.
- 2. (U) FY 1982 Program: In FY 82, Phase 3 will establish an interface capability with selected battlefield systems, complete the development of the enhanced Position Location Reporting (PLRS) User Unit, and provide an initial net management software capability for the Net Control Unit. Realistic scenarios will continue to be exercised using elements of the proposed system.
- 3. (U) FY 1983 Planned Program: Continue Phase 3. Begin establishment of a prototype system for Government testing during Phases 4 and 5.
- 4. (U) FY 1984 Planned Program: Demonstrate the ability to support selected air defense and field artillery systems, and their associated command and control requirements, during Phase 4.
- 5. (U) Program to Completion: A full PJH (ADDS) system will be used for extensive operational testing during FY 1985/86 (Phase 5). This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.18.A

DOD Mission Area: #374 - EW/C³CM Multi-Mission

Technology & Support

Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 44 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 17429	FY 1982 Estimate 17776	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion Continuing	Total Estimated Costs Not Applicable
D234	Surface/Surface Weapon E)ectronic Warfare	o	6107			Continuing	Not Applicable
D267	Air Defense/Missiles Vulnersbility/Susceptibility	15436	7452			Continuing	Not Applicable
D626	ු ³ Systems Vulnerability/Susceptibility	1993	4217			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 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

DOD Mission Area: #374 - EW/C³CM Multi-Mission

Technology & Support

Title: Electronic Variate Vulnerability/Susceptibility
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1983 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 Pershing II, ECCM modified Copperhead, Hellfire, Infantry Man-Portable Antitank Assault Weapon System (IMMAWS), TOW II, Assault Breaker, and the Terminally Guided Warhead (TGW) for the Multiple Launch Rocket System (MLRS) surface-to-surface weapon systems and enhanced Patriot, Stinger-POST, Improved Chaparral, Improved Hawk, and DIVADS air defense systems. ECM measurement systems will be upgraded to permit accurate collection of data. EW field tests will be conducted on weapons systems to validate ECCM effectiveness prior to the production and fielding of product improvements. Development and fabrication of EW testbed instrumentation of field evaluation of selected communications electronics (C-E) systems will continue. Programs to assess the EW vulnerability of C-E and night vision/electro-optical (NV/EW) systems will continue.

D. COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE					
Total Funds (current requirements)	17429	-		Continuing	Not Applicable
Total Funds (as shown in	21293			Continuing	Not Applicable

Decrease in FY 1981 is due to reprograming to meet high-priority Army requirements. Decrease in FY 1982 and FY 1983 is due to budgetary constraints not anticipated in the FY 1982 submission and the transfer of project D190 to Program Element 6.37.61.A (EW Vulnerability/Susceptibility Support) in FY 1983.

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

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Program Element: #6.37.18.A

DOD Mission Area: #374 - EW/C³CM Multi-Mission

Technology & Support

Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #4 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: All electronic/electro-optical dependent systems are to some degree susceptible to electronic warfare (EW). All such Army systems must be analyzed so that their susceptibilities are determined and counter-countermeasures (CCM) are developed to increase their effectiveness in a hostile EW environment. This program provides for EW susceptibility investigations of the air defense/missile systems, night vision systems, electro-optical (EO) systems, and other electronic dependent systems. Recommendations designed to eliminate or reduce the susceptibility of Army systems, including proposed hardware, software, and operating procedure changes, are provided to system developers.
- G. (U) RELATED ACTIVITIES: The work performed under this Program Element is being performed by US Army Electronics Research and Development Command (ERADCOM) laboratories, particularly: Electronic Warfare Laboratory (including ONEW), Fort Mommouth, NJ; Signals Warfare Laboratory, Vint Hill Farms, VA; and Night Vision & Electro-Optical Laboratory, Ft Belvoir, VA. Results of the susceptibility investigations, as well as appropriate electronic counter-countermeasures (ECCM) recommendations, are provided to the other Army development commands; e.g., Missile Command (MICOM) and Communications Electronics Command (CECOM). Other related research and studies are performed by the Air Force in Program Elements (PEs) 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); and 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). This coordination prevents no unnecessary duplication of effort within the Defense establishment.
- H. (U) WORK PERFORMED BY: In-house research, development, 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 Physical Science Laboratory, New Mexico State University, Las Cruces, NM; Sanders Associates, Nashua, NH; Stanford Research Institute, Menlo Park, CA; American Electronics Laboratory, Lansdale, PA; and Hughes Aircraft Co, Culver City, CA. Contractors will perform on approximately 13 contracts with a total dollar value of about \$4,700,000 for the program element.

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Program Element: #6.37.18.A

DOD Mission Area: #374 - EW/C³CM Multi-Mission

Technology & Support

Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: Electronics countermeasures (ECM) vulnerability studies were conducted on Safeguard, Pershing II, Lance, Nike-Hercules, Shillelagh, Dragon, TOW, Hellfire, Copperhead, Improved Hawk, Redeye, Stinger, Chaparral, US Roland, Patriot, DIVADS, and other Army missile systems and missile radar fuzes. Investigations were conducted also on Single Channel Ground and Airborne Radio System (SINGGARS), Position Location Reporting System (PLRS), PLKS/Joint Tactical Information Distribution System (JIDS) Hybrid (PJH), Firefinder radars AN/TPQ-36 and AN/TPQ-37, Standoff Target Acquisition System (SOTAS), Side Looking Airborne Radar (SLARS) AN/APS-94, and selected data links and night vision/electro-optical (NV/EO) devices. Advanced instrumentation was developed for the EW investigations of the missile systems. EW simulations were conducted on the Copperhead, Hellfire, US Roland, Redeye, Patriot, Stinger, and other missile systems, as well as the AN/ALQ-123 and AN/ALQ-145 flare countermeasures systems. Developments were initiated to provide

measurements based on near-term and far-term electronic warfare (EW) threat projections against communications and data distribution systems, radars, and NV/EW systems. Fast frequency hopping (PFH) and steerable null antenna processing (SNAP) techniques, orginally developed and demonstrated under this program, are now incorporated into the SINCGARS program.

2. FY 1982 Program: ECM investigations of the Pershing II (PII) engineering development (ED) design will continue, including extensive captive ECM flight tests; a vulnerability assessment is planned to be ready before the Army Systems Acquisition Review Council/Defensive Systems Acquisition Review Council (ASARD/DSARC) III. Electronic counter-countermeasures recommendations will be made to the developer to assist in hardening the TOW II against potential ECM. Active and passive ECM techniques will be used to verify the effectiveness of ECCM designs on the Helifire and Copperhead. EW analysis

will begin. Patriot Post-DSARC Unit IV testing and component/system design confirmation tests will be conducted. Stinger-POST missile firings will be conducted against advanced concept jammers.

simulations will be performed on the AN/DAW-1 Chaperral seeker and on the Improved Chaparral breadboard. Results of the ECM vulnerability analysis of the DIVAD check test will be provided for DSARC consideration. The EW analysis of PLRS will continue; the PJH EW

Simulation model will be completed. The Communications EW Simulator (COMEMS) threat instrumentation will be completed and readied for testing of the SINCGARS-V. Development of the Mobile EW Environment Simulator (MEWS) will progress enough to support modular integrated communications navigation system (MICNS) and Cubic data link tests.

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Program Element: #6.37.18.A

DOD Mission Area: #374 - EW/C³CM Multi-Mission

Technology & Support

Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 64 - Tactical Programs

3. FY 1983 Program: A terminal performance study of the PII in an EM environment will be completed. Live firings of Copperhead in ECM environment will be conducted, and a final vulnerability assessment made. Hellfire investigations will be extended to include new concepts and techiques. Studies/tests will be performed on candidate IMAAWS systems, Assault Breaker seeker designs, and target acquisition radar. EW assessment of the MLRS TGW will continue. The Patriot growth program vulnerability assessment will start, and EW analysis of the Antistandoff Jammer (ASOJ) will be conducted. Simulations of the production configuration of Stinger-POST will be completed to verify its ECCM capabilities. Flyby and tracking missions will be conducted on the Chapatral-POST, Night Chapatral, and Forward Area Alert Radar (FAAR).

PJR EW vulnerability assessment will continue;

The application of as an ECCM technique for PJR will be evaluated. Reactive ECM threats tests on SINCGAR-V will be conducted. MEMES will be prepared for EM field tests. EW analyses/tests of intelligence, surveillance, target acquisition/EW (ISTA/EW) data link applications will be conducted.

4. FY 1984 Program: The final phase of the PII ECM captive flight tests will be completed and live firings conducted. Laboratory/field ECM investigations and simulations will be performed on the IMAAWS ED model and on competing Advanced Indirect Fire System (AIFS) as well as on the Sense and Destroy Armor (SADARM); ECCM recommendations will be provided the system developers. A High-to-Medium Air Defense Systems (HIMADS) Simulation laboratory will be used to conduct studies to determine the HIMADS capabilities to counter

threats in an EW environment. Stinger-POST simulations will be conducted to evaluate CCM improvements. The Improved Chaparral will be field tested

The DIVAD will be tested against validated threats to verify ECCM hardening.

The PJH emitter location test instrumentation will be completed. A JTIDS be developed for full-up PJH field tests. The MEWES development will allow EW testing

testbed will

Firefinder product improvement program (PIP) ECCM tests will be conducted. Analysis/tests of ISTA/EW date link applications will be completed. EW vulnerability/ECCM assessments will begin on Fusion Systems, selected satellite communications (SATCOM) systems, tactical high frequency (HF) communications, and the Mark () identification friend or foe (IFF) system.

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

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D234

Title: Surface/Surface Weapon Electronic Warefare
Pitle: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 44 - Tactical Programs

Program Element: #6.37.18.A

DOD Mission Ares: #374 - EW/C3CH Multi-Mission Technology & Spt

A. (U) DETAILED BACKGROUND AND DESCRIPTION: All electronic-dependent missile systems are susceptible, to some degree, to electronic warfare (EM). The degree of susceptibility coupled with an assessment of the threat, economics, technical and tactical fessibility of implementing a particular electronic countermeasure (ECM) technique provides a measure of whether a mystem is vulnerable to ECM. All US Army weapon systems must be analyzed and systematically subjected to laboratory and field investigations to establish levels of susceptibility to ECM so that electronic counter-counteracasures (ECCM) techniques may be developed. Implementation of effective ECCM techniques in the systems will reduce or eliminate their vulnerrbility to ECM, thus assuring a high level of system effectiveness in a hostile electronic warfare (EW) environment. The objectives of this project are to:

- 1. (U) Determine the susceptibilities to ECM of US Army general support and close combat weapon systems and selected air defense and surface targeted missile fuze systems.
- 2. (U) Develop state-of-the-art prototype ECM techniques and devices to evaluate the effects of current, 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) Provide the Army with independent EW vulnerability assessments to assist in major decisions -- In Process Review (IPR), Army Systems Acquisition Review Council (ASARC), Defense Systems Acquisition Review Council (DSARC).
- 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

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Project: #0234
Program Element: #6.37.18.A
DOD Mission Ares: #374 - EM/C3CM MultiMission Technology & Spt

Title: Surface/Surface Weapon Electronic Warefare
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #4 - Tactical Programs

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.C.) 6.37.50.F, 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; and 2.45.73.N, Navy Cover and Deception Programs. There is no unnecessary duplication of effort.

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 Sanda Missile Range (WSMR), NM. Major contractor support is provided by: OAO Corp., Beltsville, MD; New Mexico State University, University Park, NM; RCA, Cherry Hill, NJ; and Martin Marietta Corp., Orlando, FL. Contractors will perform on approximately 5 contracts with a total value of \$1 million for the project-

D. (U) PROGRAM ACCOMPLISHMENT AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: This effort was funded under Program Element (PE) 6.37.18.A/D267, Air Defense Weapons Systems to Unincrability/Susceptibility. ECM susceptibility/unincrability investigations were conducted on numerous weapon systems to include: Lance, Pershing I, Shillelagh, Dragon, Tube-Launched, Optically Tracked, Wire-Guided (TOW), Heliborne Laser, Fire-and-Forget HELLFIRE, and Copperhead. Vulnerability assessments of radio frequency (RF) fuxes for air defense missile systems (Patriot, Chaparral, Roland, DIVADS) were conducted. Implemented several ECCM recommendations as Pershing II (PII) transitioned into angineering development (ED). A modified version of the AN/MLQ-T2, which is the principal threat-emulating test device, was upgraded to reflect postulated enemy electronic warfare (EW) capabilities. Static and live firing tests of TOW II missiles in EW environments were conducted in support of development tests/operational tests (DT/OT II). A development contract for a device for susceptibility tests of the Sense and Destroy Armor (SADARM) and Tank Breaker was swarded. Provided and operated ECM devices for Tank Breaker captive flight tests. Laboratory and field tests and simulations were conducted on the present HELLFIRE laser seeker design to evaluate missile performance in an electro-optical countermessures (EOCM) environment. EN laboratory, field tests, and EN vulnerability assessments were conducted on the Target Acquisition and Designation System (TADS) for the Advanced Attack
Helicopter (AAB). Laboratory tests were conducted on ECCM modified Copperhead seekers. A susceptibility study of two seekers being developed under the Assault Breaker Program was completed and plans for a study of millimeter wave seekers initiated. A vulnerability investigation of the Multiple Launch Rocket System (MLRS) digital data and voice

Project: #D234

Program Element: #6.37.18.A DOD Mission Area: #374 - EW/C3CM Multi-

#374 - EW/C3CM Multi-Mission Technology & Spt

Title: Surface/Surface Weapon Electronic Warefare
Title: Electronic Warfare Vulnerability/Susceptibility

Budget Activity: #4 - Tactical Programs

communications radio AN/VRC-46 was completed. Infrared signature measurements of the MLRS Self-Propelled Launcher Loader were made and findings reported. High-velocity sled tests against EW threat-emulating aircraft to evaluate ECCM to the Improved US Roland fuze were performed and results presented to the project manager and international Project ROLF (Roland fuze) Committee, Paris, France. A contract for a Mobile Instrumentation Data Analysis System (MIDAS) for continuing fuze efforts was awarded.

2. FY 1982 Program: This is a new project starting in FY 1982. Development of the terminal performance prediction technique (TPPT) simulation for Pershing II (PII) initiated in FY81 will continue. ECM investigation of the PII engineering design (ED) will continue using upgraded threat emulating devices and test instrumentation. Extensive ECM field tests will be conducted on an airborne (captive flight) PII radar area correlator. Data will be analyzed and inputs provided for the development of a statistical error model for the TPPT simulation. An ECM vulnerability assessment will be provided for the PII Army and Defense Systems Acquisition Review Councils (ASARC/DSARC) III. Preparations for PII/EW live firing tests in FY83 will be initiated. Special TCM II optical countermeasure (CM) tests will be conducted based on the implications of lasers on the battlefield. Special test instrumentation will be developed using off-the-shelf hardware. Plans and specifications for the development of a state-of-the-art EW device will be prepared based on the results of simulations and preliminary vulnerability tests. Laboratory and field tests will be conducted on brassboard Sense and Destroy Armor (SADARM)

seekers to establish baseline EW susceptibility data. Specifications for an area coverage
.ECM device will be developed based on test results. EW vulnerability reports on HELLFIRE and TADS will be published prior to the HELLFIRE/AAH ASARC/DSARC III. Analyses, laboratory tests, and simulations of HELLFIRE

will continue. Follow-on tests based on ASARC/DSARC decisions and recommendations will be conducted on HELLFIRE and TADS. Detection and location measurements of the Ground Laser Locator Designator (GLLD) will be initiated.

Copperhead/EW live firing tests will be conducted on the latest Copperhead seeker design. Final plans and preparations for live firing tests in PY83 will be completed. An electronic countermeasures (ECM) susceptibility study of

MLRS Terminally Guided Warheads (TGW) Program will be initiated. Analyses of the Patriot fuze

data will continue. A program plan will be developed and efforts initiated on the Patriot fuze processor improvement program. A contract will be swarded to supplement in-house fuze modeling and simulation programs. The Improved US Roland fuze vulnerability program will be completed. Analyses and field tests will be conducted on the Division Air Defense System (DIVADS) fuze leading to an ECM vulnerability assessment.

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Project: #D234

Program Element: #6.37.18.A

DOD Mission Ares: #374 - EW/C3CM Multi-

Mission Technology & Spt

Title: Surface/Surface Weapon Electronic Warefare tle: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #4 - Tactical Programs Title:

- FY 1983 Planned Program: A terminal performance study and development of a computer simulation model of 3. assessing Pershing II (PII) missile terminal performance in an electronic warfare (EM) environment 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. Laboratory susceptibility tests will be conducted on the latest Copperhead electronic counter-countermeasures (ECCH)-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. HELLFIRE missile flight simulation models and wargame 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 HELLFIRE seeker designs. ECM laboratory/ffeld investigations will be performed on Infantry Manportable Assault Antiarmor Weapon Systems (IMAAMS) candidate systems to evaluate system concepts and performance under specified EM 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. Susceptibility/vulnerability assessment of terminally guided warheads for the Multiple Launch Rocket System (MLRS) will contime. EW investigations of electro-optic missiles and subsystems will continue. Tri-Service efforts in ECM exploitation will continue.
- (u) FY 1984 Planned Program: The final phase of Pershing II (PII) ECM captive flight tests will be completed and 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 INAAMS engineering development model to assess its performance under various EM 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 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 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 efforts in ECM exploitation will continue.

Title: Surface/Surface Weapon Electronic Warefare
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 44 - Tactical Programs

Project: #D234
Program Element: #6.37.18.A
DOD Mission Area: #374 - EW/C3CM Multi-Mission Technology & Spt

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

6. (U) Major Milestones: Not applicable

7. Resources (\$ in thousands):

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	Not Applicable	6107			Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	Not Applicable	6122			Continuing	Not Applicable

This project began in FY 1982. Decreases in FY 1982 due to inflation indices changes. FY 1983 decreases due to reallocation of Army funds to meet higher priority Army requirements.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # D267
Program Element: # 6.37.18.A

DOD Mission Area: #374 - EW/C3CM Multi-Mission
Technology & Support

Title: Air Defense Missile Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 44 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The current version of the future battlefield reflects increased use by the enemy of electronic warfare (EW) devices designed to reduce the effectiveness of US Army air defense systems that rely upon electronic/electro-optical sensor systems. All such US Army systems must be investigated and tested so that their degree of susceptibility is determined. This program provides for EW susceptibility investigations of missile/gum radar-controlled or electro-optically guided systems, other electronic sensors such as battlefie. *urveillance radars and command and control electronic devices, and air defense suppression systems which represent a threat to the tactical field commander. Recommendations for inclusion of electronic counter-countermeasures (ECCM) to assure wespons effectiveness in a hostile EW environment including ECCM hardware technology, redesigned software, and revised operating procedures are provided to the system developer and production decisionmakers. The objectives of this program are to: Determine the susceptibility to validated threat level EW of US Army gun/missile air defense weapons systems; determine the effectiveness of enemy air defense suppression threats to the Army in the field; develop test EW systems designed to replicate the validated threats; and provide to US Army developers recommendations on ECCM circuits, systems, and devices to reduce susceptibilities.
- B. (U) RELATED ACTIVITIES: Work performed under this project is directly applicable to research being performed by other US Army Electronics Research and Development Command (ERADCOM) laboratories, specifically: Electronic Warfare Laboratory (ENL), Fort Hormouth, NJ; Harry Diamond Laboratories (HDL), Adelphi, MD; and Night Vision and Electro-Optical Laboratory (NVEOL), Fort Belvoir, VA. It is also applicable to the development of the Armament Research and Development Command (ARRADCOM) and the Missile Command (MICOM). Other related research and studies are performed by the Air Force and the Navy. Air Force work is accomplished in PE Numbers: 6.37.50.F (Countermeasures Advanced Development); 6.37.18.F (Electronic Warfare Technology); and 6.37.43.F (Electro-Optic Warfare). Navy work is done in PE Numbers: 6.37.96.N (Airborne Electromagnetic and Optical Systems); 6.37.97.N, (Surface Electromagnetic and Optical Systems); and 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 Secretary of Defense (Under Secretary of Defense for Research and Development). There is no unnecessary duplication of effort.

Project: # D267
Program Element: # 6.37.18.A
DOD Mission Area: #374 - EW/C³CM Multi-Mission
Technology & Support

Title: Air Defense Missile Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 44 - Tactical Programs

C. (U) WORK PERFORMED BY: In-house research, EW engagement simulations, ECM threat jammer development, exploitation projections, EW field tests, and vulnerability/susceptibility analyses are conducted by the Office of Missile Electronic Warfare, Electronic Warfare, Electronic Warfare, Electronic Warfare Laboratory, Electronics Research and Development Command at White Sands Missile Range, NM. Major contractor support is provided by Physical Science Laboratory, New Mexico State University, NM; General Electric, Utica, NY; and Hughes Aircraft Co., Culver City, CA. Approximately 10 contracts will be conducted with a total dollar value of approximately \$2,400,000.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- FY 1981 and Prior Accomplishments: ECM vulnerability investigations were conducted on Nike Hercules Safeguard, Redeye, Forward Area Alert Radar (FAAR), Stinger, Stinger-POST, Chaparral, Patriot, Improved Hawk, US Roland, DIVAD, and other Army missile systems and associated radar fuzes. Theoretical analyses of the effects of ECM were accomplished on the Improved Chaparral, the Forward Looking Infrared (FLIR) device, Stinger-POST, Patriot, US Roland, and DIVAD.

 EW simulations were completed on US Roland, Redeye, Patriot, Stinger, and Chaparral air defense weapons systems, and the ALQ-123 and 145 flare countermeasure (CM) systems. In-house developments were completed on an infrared target image simulator, a coherent automated target simulator, a test environment certification complex, a data analysis and graphics system, a family of five barrage, deception and transponder test jammers, and software to support modeling of simulated electro-optical and electromagnetic EW engagements. Two test jammers were developed for field investigations of Stinger-POST and Improved Chaparral Weapons systems, and three mobile test environment certification complexes were fielded to monitor multiple aircraft EW transmissions. Completed research and design of a Modular Advanced Test Jammer (MATJAM) family required to support 1987 and beyond threat level testing. Initiated design to statically simulate the standoff jammer threat. The EW test planning and field operations were completed for the initial CM tests on Stinger-POST, the Patriot Post-Defense Systems Acquisition Review Council tests in Unit I, II, and III, the Operational Test and Evaluation Agency (OTEA) large-scale search track exercise, the DIVAD Development Test/Operational Test II, the US Roland Special EM Evaluation Test, and the Roland modified fuze EM sled test. Vulnerability investigations of ECCM-related Improved Hawk product improvements were completed.
- 2. FY 1982 Program: The Patriot Post-DSARC Unit IV testing and the component/system design confirmation tests will be conducted. Additional jammer inventory will be fabricated to support the follow-on evaluation electronic countermeasures (ECM) vulnerability tests. Vulnerability analyses will be provided as newly acquired test data are analyzed. Stinger-POST vulnerability missile firings will be conducted against the advanced concept test jammers. Continued

Project: # D267

Program Element: # 6.37.18.A

DOD Mission Area: #374 - EM/C3CM Muiti-Mission
Technology & Support

Title: Air Defense Missile Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 44 - Tactical Programs

simulations will be conducted on the air-to-sir version of the Stinger-POST and the developing Stinger-POST system. Theoretical analysis will be performed

Investigation of CM concepts

will be initiated.

simulations on the Improved Chaparral breadboard will be conducted. The infrared threat will be assessed and updated to define the validated 1987 and beyond ECM parameters. Support will be provided for the DIVAD check test to include ECM vulnerability analysis

Performance qualification tests

will be conducted on the Improved Hawk product improvements.

3. FY 1983 Planned Program: The Patriot growth program vulnerability assessment will start

EW analysis of the Antistandoff Jammer will also be pursued. Simulations on the production configuration of Stinger-POST will be completed to establish ECCM capabilities. CM analysis of the multipurpose lightweight missile will be conducted to establish the adaptability of Stinger-POST application to this missile concept. Theoretical analysis of the advanced imaging seeker technology will continue. Flyby and tracking missions will be conducted on the Chaparral/POST, Night Chaparral, and FAAR

Inventory modernization will be completed to support the DIVAD advanced follow-on ECCM tests. Programs will be implemented to determine subsystems vulnerabilities in areas such as the advanced Short-Range Air Defense (SHORAD) weapons systems, command and control SHORAD system battle area surveillance radars, and identification, friend or foe (IFF) systems.

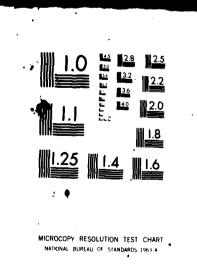
4. FY 1984 Planned Program: Evaluations and analyses of the Patriot growth program investigation of ECCM effectiveness will be conducted. A High-to-Medium Air Defense (HIMADS) simulation laboratory will be placed in operation
. HIMADS capabilities to counter antiradia-

tion missile, and Air Supported Threat Defense threats will be investigated

Stinger-POST verification will be made to evaluate CCM improvements. Digital models of the advanced imaging seeker will be developed to assess electro-optical CCM algorithms. The Improved Chaparral will be field tested against advanced electro-optic CM devices. Laboratory analysis of threat-developed laser CM will be initiated. The DIVAD Gun System will be subjected to validated threats to verify ECCM

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Project: # D267
Program Element: # 6.37.18.A
DOD Hission Area: #374 - EW/C³CM Hulti-Mission
Technology & Support

Title: Air Defense Missile Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: #4 - Tactical Programs

hardening. The air-to-air multipurpose lightweight missile will be subjected to devices in a series of flight tests.

test

- 5. (U) Program to Completion: This is a continuing program.
- 6. (U) Major Milestones: Not applicable.
- Resources (\$ in thousands):

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	PY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	15436	7452			Not Applicable	Not Applicable
Funds (as shown in FY 1982 submission)	17554	7470			Not Applicable	Not Applicable

Differences in FY 1981, FY 1982, and FY 1983 are due to reprograming to meet higher priority requirements.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # D626
Program Element: # 6.37.18.A
DOD Mission Area: #374 - EW/C3CM Multi-Mission
Technology & Support

Title: C³ Systems Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 44 - Tactical Programs

- A. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: All command/control/communications (C3) systems are susceptible, to some degree, to electronic warfare (EW). The degree of susceptibility, coupled with an assessment of the threat, and technical and tactical feasibility of implementing a particular EW technique, provides a measure of whether a system is vulnerable to EW. All US Army C3 systems must be analyzed and systematically subjected to analysis and laboratory/field investigations to establish levels of vulnerability to EW so that electronic counter-countermeasures (ECCM) techniques may be developed and implemented. Implementation of effective ECCM techniques in C3 systems will reduce or eliminate their vulnerability to EW, thus assuring command and control of critical weapons systems in a hostile EW environment. The objectives of this project are to:
 - 1. (U) Determine the susceptibility/vulnerability of C3 systems to hostile EW.
- 2. (U) Develop state-of-the-art prototype intercept, emitter location and jamming 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 technical ECCM techniques er demonstrate each technique to US C3 system developers and users.
- 4. (U) Recommend technical and tactical ECCM fixes to US C3 system developers and users to reduce or eliminate vulnerabilities of our systems to enemy EW.
- B. (U) RELATED ACTIVITIES: The work performed under this project directly affects the development work being performed by the US Army Communications and Electronics Command (CECOM) and other C3 systems developers involved with intelligence surveillance and target acquisition (ISTA). The developing organizations are informed of the results of each EW susceptibility/vulnerability analysis/test through formal reports and day-to-day informal personal contacts, particularly at the project engineer level. Other related research and investigations are performed by the Air Porce in Program Element (PE)

Project: #b626 Program Element: \$ 6.37.18.A DOU Mission Ares: 374 - EW/C³Ch Multi-Mission Technology & Support Title: C3 Systems Vulnerability/Susceptibility Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 4 - Tactical Programs

6.37.50F (Counter-Countermeasures Advanced Development), 6.37.18.F (Electronic Warfare Technology), 6.37.43F (Electro-Optic Warfare). Navy work is found in PE Numbers 6.37.96N (Airborne Electromagnetic and Optical Systems), 6.37.97N (Surface Electromagnetic and Optical Systems), and 2.45.73N (Navy Cover and Deception Programs). There is no unnecessary duplication of effort.

- C. (b) WORK PERFORMED BY: In-house research, development and C3 system susceptibility/vulnerability analyses/tests are Conducted by the Electronic Warfare Laboratory, a subordinate element of the US Army Electronics Research and Development Command (ERADCM) at Fort Hommouth, NJ. Hajor contractor support is provided by: Sanders Associates, Nashua, NH; American Electronics Laboratory (AEL), Lansdale, PA; SRI International, Menlo Park, CA; and Computer Sciences Corp., Fails Church, VA. Contractors will perform on approximately 10 contracts with a total dollar value of \$2,500,000 for the project.
- D. (U) PROGRAM ACCOMPLISHMENTS AND PUTURE PROGRAMS:
 - FY 1961 and Prior Accomplishments:

Project: #D626
Program Element: # 6.37.18-A
DOD Hission Area: 374 - EW/C³CM Multi-Mission
Technology & Support

Title: C³ Systems Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 4 - Tactical Programs

2. FY 1982 Program:

3. FY 1983 Planned Program:

Project: #1626
Program blement: # 6.57.18.A
DOD Hission Area: 374 - EW/C³CM Hulti-Mission
Technology & Support

Title: 6 Systems Vulnerability/Susceptibility
Title: Electronic Warfare Vulnerability/Susceptibility
Budget Activity: 4 - Tactical Programs

FY 1964 Planned Program:

- 5. (U) Program to Completion: This is a continuing program.
- 6. (U) Hajor Milestones: Not applicable.

Project: #D626
Program Element: # 6.37.18.A
DOD Mission Ares: 374 - EW/C3CM Multi-Mission Technology & Support

Title: C³ Systems Vulnerability/Susceptibility
Title: Blectronic Warfare Vulnerability/Susceptibility
Budget Activity: 4 - Tactical Programs

7. Resources (\$ in thousands):

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	1993	4217			Continuing	Not Applicable
Funds (as shown in PY 1962 submission)	3739	4226			Continuing	Not Applicable

Decreases in FY 1961, and FY 1962, and FY 1963 are due to reprograming to meet higher priority requirements.

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.21.A

DOD Mission Area: #276 - Defensive Chemical and

Biological Systems

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

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 17393	FY 1982 Estimate 20026	FY 1983 Estimate 26542	FY 1984 Estimate 28799	Additional to Completion Continuing	Total Estimated Cost Not Applicable
DESO	Individual Chemical Protection Materiel	o	621	0	492	Continuing	Not Applicable
DESI	Chemical Decontamination Hateriel	4023	3098	2681	1446	Continuing	Not Applicable
DJ30	Collective Protective Material for Armored Vehicles	4058	5259	5465	5486	Continuing	Not Applicable
D601	Chemical Detection & Warning Materiel	7130	10014	17892	20411	Continuing	Not Applicable
D604	Collective Chemical Protection Materiel	2182	1034	504	964	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: There is an urgent need to provide all Services with an improved rapid detection and warning system which will provide United States (US) Forces with early warning of an approaching chemical agent attack, and improved individual and collective protection material and other equipment to protect against chemical attack, whether in vapor or liquid/aerosol form. The Army has the Executive Agent responsibility for conducting chemical/biological defense research and development for the Department of Defense (DOD). This program covers defensive systems and equipment to protect individuals and groups from chemical agents by providing: protection for the respiratory systems

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Program Element: #6.37.21.A

DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

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

and body; 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 for shelters, armored vehicles, vans, and associated equipment. Failure to correct these Nuclear-Biological-Chemical (NBC) defense deficiencies would seriously jeopardize the survivability of US Forces in the event of a chemical attack.

C. (U) BASIS FOR FY 1983 RDTE REOUESTS: Advanced development (AD) will be completed on the Jet Exhaust Decontamination System (JEDS, XM16), Interior Surface Decontamination System (ISDS, XM15), and Simplified Collective Protection Equipment (SCPE, XM20). The SCPE (XM20) will be type classified directly from AD based upon successful completion of the Development and Operational Tests and user acceptance. AD will be continued on the Remote Sensing Alarm; i.e., Scanning Infrared Remote Alarm (SCIREACH, XM21), under authorization by the user and developing agency of a redirected development effort. AD will also continue on the Automatic Liquid Agent Detector (ALAD, XM82) and the Automatic Chemical Agent Detector and Alarm (ACADA, XM22). AD will be initiated on a Nuclear, Biological, Chemical (NBC) Reconnaissance System III (RECON III). These items are essential to meet the objectives of a totally integrated NBC defense posture.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1982	17393	20026	26542	Continuing	Not Applicable
submission)	21036	20084	16956	Continuing	Not Applicable

The reduction of \$3643 thousand in the FY 1981 funding level is a result of reprograming to higher priority Army requirements. The decrease of \$58 thousand in FY 1982 is the result of the amended budget request and the application of revised inflation indices. The funding increase of \$9586 thousand in FY 1983 is due to the extended Advanced Development (AD) program requirements for the Remote Sensing Chemical Agent Alarm, XM21.

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

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Program Element: #6.37.21.A /
DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

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

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: After the 1973 Mideast War and the suspected use of chemical agents in Laos, intensive coordination between the materiel user and the materiel developer was begun to identify urgent filld needs and translate them into requirements. The reported use of chemical agents in Afghanistan has intensified these ifforts. The results of several general officer reviews by the Services and the Defense Science Board recommendations are implemented by this program. The objective of this program is to conduct advanced development for all Services on rapid detection and warning systems to warn of a chemical attack and to develop protective materials and equipment to provide protection. This program covers defensive systems and equipment to protect individuals from chemical agents by providing: protection of the respiratory system and all body surfaces; manual and automatic detection and warning devices that respond to toxic agents on all surfaces, in the atmosphere, and in food and water; and means to decontaminate skin, clothing, equipment, and terrain. It also provides for the development of collective protection equipment/material to provide rest and relief to personnel performing certain headquarters and communications functions, and for certain armored vehicle crews to relieve the stresses and restrictions inherent in wearing individual protective equipment while performing their mission in an active chemical environment.
- G. (U) RELATED ACTIVITIES: DOD Directive 5160.5 assigned the Army responsibility for developing Chemical/Biological (CB) defense equipment which has Joint Service Operational Requirements. Each service retains development responsibility for service-specific requirements in CB defense equipment. Precursor 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. Succeeding engineering development work is being done under Program Element 6.47.25.A, Chemical Defense Materiel.
- H. (U) WORK PERFORMED BY: In-house: Chemical Systems Laboratory, Aberdeen Proving Ground, MD; Human Engineering Laboratory, Aberdeen Proving Ground, MD; Arctic Test Center, Fort Greely, AK; and Tropic Test Center, Panama. Contractor: Calspan, Buffalo, NY; Honeywell, Orlando, FL; Bendix, Towson, MD; Donaldson, Minneapolis, MN; American Air Filter, Ellicott City, MD; and Brunswick, Marion, VA.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: A 1978 review of the services' chemical decontamination capability resulted in the Army's decision to initiate an accelerated program to improve this capability. During FY 1979 the following were

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Program Element: #6.37.21.A

DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

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

accomplished; (1) Advanced Development (AD) of the remote sensing chemical agent alarm was reinitiated; (2) AD was continued on the 19-liter decontamination apparatus for vehicles and decontamination procedures for weapons systems; and (3) the information gap study program related to collective protection for armored vehicles was expanded to cover areas such as ventilation parameters, liquid agent transport, agent transport due to personnel entry/reentry, and crew compartment decontamination. During FY 1980 the following were accomplished: (1) Phase I prototype tests and Special In-Process Review (IPR) were held on the Decontamination Apparatus Portable, XN13; (2) a Letter of Agreement (LOA) was approved and Advanced Development (AD) initiated on the Interior Surface Decontamination System; (3) AD was initiated on the Large-Scale Decontamination Device (Jet Exhaust System); (4) AD contract was awarded and concept feasibility IPR was conducted on the Testing Kit for Chemical Agents in Water, XM 272; (5) AD was continued on the hybrid collective protection equipment for armored vehicles; and (6) the LOA was approved and AD initiated on the Automatic Liquid Agent Detector (ALAD), XM82. AD was continued on the Remote Sensing Chemical Agent Alarm, XM21. During FY 1981, AD continued on the Jet Exhaust Decontamination System, Interior Surface Decontamination System, Decontamination Apparatus Portable (XM13), Remote Chemical Agent Sensing Alarm (XM21), ALAD (XM82), Water Testing Kit, and Simplified Collective Protection Equipment (XM20).

- 2. (U) FY 1982 Program: AD will be completed on the Water Testing Kit (XM272). This item will transition to engineering development (ED) in Program Element (PE) 6.47.25.A. AD will be continued on the Jet Exhaust Decontamination System (JEDS, XM16), Interior Surface Decontamination System (ISDS, XM15), Remote Sensing Alarm (SCIREACH, XM21), Automatic Liquid Agent Detector (ALAD, XM82), Simplified Collective Protection System (SCPE, XM20), and Hybrid Collective Protection Equipment (HCPE). ED will be initiated on the Automatic Chemical Agent Detector and Alarm (ACADA, XM22).
- 3. (U) FY 1983 Planned Program: AD will be completed on the Jet Exhaust Decontamination System (JEDS, XM16), Interior Surface Decontamination System (ISDS, XM15), Automatic Liquid Agent Detector (ALAD, XM62), and Simplified Collective Protection System (SCPE, XM20). The JEDS (XM16) and ISDS (XM15) will transition to engineering development (ED) under Program Element (PE) 6.47.25.A. The SCPE (XM20) will complete an expanded Development and Operational Test program, and pending satisfactory compliance with all stated requirements, will be type classified directly from AD and initial production begun. AD will be continued on the SCIREACH (XM21), ACADA (XM22), and hCPE. AD will be initiated on the NBC Reconnaissance System III (NBC RECON III)
- 4. (U) PY 1984 Planned Program: AD will be completed on the Personal Equipment Decontamination System (PEDS) in midyear with transition to ED under PE 6.47.25.A. AD will be continued on the NBC RECON III. AD will be initiated on the

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Program Element: #6.37.21.A

DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

Title: Chemical Defense Materiel Concepta
Budget Activity: 4 - Tactical Programa

NBC Detector Remote which is a second-generation remote sensor based upon laser principles and which will become a principal component of the NBC RECON III. In addition, work on an Advanced Collective Protection System (ACPS) for vehicles, vans, and shelters will be initiated.

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

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DJ30

Program Element: #6.37.21.A

DOD Mission Area: #276 - Defensive Chemical and Biological Systems

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

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Soviet Union continues to maintain a significant chemical warfare capability. The evidence indicates 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 a plan to provide nuclear-biological-chemical (NBC) protection for combat vehicles in development or procurement by 1981, which was done. Subsequently, enemy threat assessment and review of the Army's tactical doctrine for operating in a chemically contaminated environment resulted in an Army plan for providing NBC collective protection for fleet as well as developmental combat vehicles and their crews. This program is structured to support these specified needs to improve the Army's survivability on the battlefield in a contaminated environment. Specifically, this program provides Advanced Development of new and improved collective protection equipment for armored vehicles. This goal will be achieved through the development of an improved air purification system which can be used for positive pressurization of the vehicle, if it is assigned a rear area mission, or in providing ventilated facepiece protection if it is assigned a forward area mission. The provision of the improved collective protection system will enable the crews to perform combat duties without the encumbrance of complete individual protective equipment when operating in an NBC-contaminated environment.
- B. (U) RELATED ACTIVITIES: Related efforts are conducted under Program Element 6.37.21.A, Chemical Defense Materiel Concepts, Project D604, Collective Chemical Protection Materiel; Program Element 6.47.25.A, Chemical Defense Materiel Concepts, Project D017, CB Collective Protection; and Program Element 6.47.25.A, Chemical Defense Materiel Concepts, Project D018, Collective Protection-Vehicles and Vans. Related exploratory development is conducted under Program Element 6.27.06.A, Chemical Biological and General Investigations, Project A553, Chemical Biological Defense and General Investigations. Foreign state-of-the-art will be considered throughout the RDTE cycle. Related data is exchanged with allied countries via data exchange agreements and NATO Panel VII-NBC Defence.
- C. (U) WORK PERFORMED BY: US Army Tank-Automotive Command (TACOM), 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

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Project: #DJ30

Program Element: #6.37.21.A DOD Mission Area: #276 - Defensive Chemical and

Biological Systems

Title: Collective Protection Materiel Armored Vehicles

Title: Chemical Defense Materiel Concepts Budget Activity: 14 - Tactical Programs

Ground, MD. Honeywell, Inc., St. Petersburg, FL, is the prime contractor on the Hybrid Collective Protection Equipment (HCPE).

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Advanced Development (AD) of collective protection material for armored vehicles was initiated in FY 1978 under Program Element/Project (PE/PROJ) 6.37.21.A. D604, Collective Chemical Protection Materiel. PE/PROJ 6.37.21.A, DJ30, Collective Protection Materiel for Armored Vehicles, was initiated in FY 1980. The following are the significant events that have occurred under Project D604 and are directly related to the efforts ongoing in Project DJ30: (a) Secretarial Determination and Findings (D&F) was approved July 1979 and (b) Development Test I Operational Test I (DT I/OT I) on the hybrid system was initiated March 1979. The AD contract on the hybrid system was awarded during June 1980 under project DJ30. At the beginning of this program (FY 1978), US ROLAND was the oly armored vehicle, of the nine identified as having Congressional interest, requiring the Hybrid Collective Protection quipment The remaining eight vehicles were earmarked for the Ventilated Facepiece System. Therefore, providing the hybrid system to US ROLAND received top priority during FY 1980. In early FY 1980, the M1 Tank, Multiple Launched Rocket System (MLRS), and Division Air Defense Gun (DIVAD) were identified by the user as possible candidates for the hybrid system. preliminary concept review of the Honeywell Inc. hybrid design was held during September 1980 at Chemical Systems Laboratory. Concepts were presented for both US ROLAND application and the modular approach to Hybrid Collective Protection Equipment.

During FY 1981, work on information voids and data gap program related to collective protection for armored vehicles and crews continued. Development Test I/Operational Test I on the Hybrid Collective Protection Equipment (HCPE) was completed. The assessment of vehicle crew compartment air leakage reduction concepts was continued. Compatibility/suitability tests directed toward the integration of detection, alarm, and decontamination apparatuses into armored vehicles was continued. The MI auxiliary power unit (APU) turbine was evaluated as a possible interior decontamination source. Design, construction, and testing of the prototype centrifugal dust separator continued. The centrifugal dust separator will be evaluated as a possible product improvement on armored vehicles with ventilating blowers.

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Project: #DJ30

Program Element: #6.37.21.A

DOD Mission Area: #276 - Defensive Chemical and Biological Systems

Title: Collective Protection Material Armored Vehicles

Title: Chemical Defense Materiel Concepts
Budget Activity: 44 - Tactical Programs

- 2. (U) FY 1982 Program: Continue Advanced Development (AD) of the Hybrid Collective Protection Equipment (HCPE) to include the following: (a) initiate Development Test II/Operational Test II (DT II/OT II) on the HCPE with emphasis on collecting data to prove reliability and maintainability, and (b) continue design construction and testing of prototype HCPE to correct deficiencies identified during DT II/OT II. Continue test and evaluation efforts to establish performance and hazard data to quantify the relative overall protective performance of NBC protective systems installed on armored vehicles. Simulated challenge of agents, smokes, radioactive particulates and dusts will be performed on vehicles in both static and simulated operation models.
- 3. (U) FY 1983 Planned Program: Continue AD of the HCPE to include the following: (a) complete DT II/OT II; (b) finalize all design, construction, and testing; (c) complete the technical data package; and (d) conduct Development Acceptance In-Process Review (DEVA-IPR). HCPE will be type classified from a combined advanced and engineering development effort conducted under this project. Continue data collection efforts, as required, to quantify unknowns and fill information data gaps relative to MBC collective protection systems.
 - 4. (U) PY 1984 Planned Program: Complete development of HCPE System and data collection efforts.
 - 5. (U) Program to Completion: Continuing.
 - 6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Development Test I/		
Operational Test I	March 1979-November 1981	March 1979-November 1981
Development Test II/		
Operational Test II	March 1982-November 1982	March 1982-November 1982
Development Acceptance		
In-Process Review	February 1983	February 1983

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Project: #DJ30 Program Element: #6.37.21.A

DOD Mission Area: 1276 - Defensive Chemical and

Title: Collective Protection Materiel Armored Vehicles

Title: Chemical Defense Materiel Concepts
Budget Activity: \$4 - Tactical Programs

Biological Systems

Current Milestone Dates Milestone Dates Shown in FY 1982 Submission

Type Classification Initial Operational Capability

Major Milestones

February 1983 February 1984 February 1983 February 1984

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

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	4058	5259	5465	5486	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	4337	5274	5556	-	Continuing	Not Applicable

The reduction of \$2.79 thousand in FY 1981 is a result of reprograming to higher priority Army requirements. The funding decrease of \$15 thousand in FY 1982 is a result of the amended budget request and the application of revised inflation indices. The decrease of \$91 thousand in FY 1983 is due to program refinement of estimated fund requirements to accomplish program objectives.

Other Appropriations: Not Applicable.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D601

Program Element: #6.37.21.A

DOD Hission Area: 1276 - Defensive Chemical and Biological Systems

Title: Chemical Detection and Warning Materiel
Title: Chemical Defense Materiel Concepts
Budget Activity: #4 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: There is an urgent need to provide all Services with an improved rapid detection and warning system which will provide United States (US) forces with early warning of an approaching chemical agent attack, whether in vapor or liquid/aerosol form. The suspected use of chemical agents in Afghanistan has caused an intensification of research and development efforts and the chemical system program review directives form the basis of the proposed detection and warning program. Current detection systems lack necessary response time, sensitivity, agent specificity and off-target detection capability. Failure to correct these chemical defense deficiencies would seriously jeopardize the survivability of US Forces in the event of a chemical attack. This project supports Advanced Development of an integrated detection and monitoring capability for all known threat agents to prevent contamination and rendering our combat forces ineffective, and to determine the need for decontamination.
- B. (U) RELATED ACTIVITIES: No comparable work is done by other Services. Coordination is maintained with the other Services to assure provision of required detection and warning material and avoid duplication of effort. Coordination and cooperation are maintained with allied countries via Data Exchange Agreements and through meetings of North Atlantic Treaty Organization (NATO) Panel VII-NBC Defense. Companion Engineering Development (ED) work is being done under Program Element 6.47.25.A, Chemical Defense Material, Project D020, Chemical Detection Warning and Sampling Devices. Related Exploratory Development work is being conducted 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: US Army Chemical Systems Laboratory, Aberdeen Proving Ground, MD. Contracts: Honeywell, St Petersburg, FL; Bendix, Towson, MD; Calspan, Buffalo, NY; and Mine Safety Appliance Co. Murrysville, PA.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: During FY 1979, advanced development (AD) was reinitiated on the Remote Sensing Alarm; i.e., Scanning Infrared Remote Alarm, Chemical (SCIREACH, XM21). During FY 1980, the Letter of Agreement (LOA) was approved and AD initiated on the Water Test Kit (XM272) and Automatic Liquid Agent Detector (ALAD, XM82). AD was continued on SCIREACH (XM21). During FY 1981, AD was continued on SCIREACH (XM21), ALAD (XM82), and the Water Test Kit (XM272). AD was initiated on the Automatic Chemical Agent Detector and Alarm (ACADA, XM22), under a Joint Service Operational Requirement (JSOR) approved in 1979.

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Project: #D601 Program Element: #6.37.21.A

DOD Mission Area: 276 - Defensive Chemical and Biological Systems

Title: Chemical Detection and Warning Materiel
Title: Chemical Defense Materiel Concepts
Budget Activity: #4 - Tactical Programs

- 2. (U) FY 1982 Program: Because of a change in user requirements, the AD program was extended on the Remote Sensing Alarm (SCIREACH, XM21). The redirected program has now been approved by user and developer commands and will proceed on an expedited development basis with extended AD and short maturation phase engineering development (ED). AD will be completed in midyear on the Water Testing Kit (XM272). AD will also be continued on the Automatic Chemical Agent Detector and Alarm (ACADA, XM22) and the Automatic Liquid Agent Detector (ALAD, XM82).
- 3. (U) FY 1983 Planned Program: AD will be completed on the Automatic Liquid Agent Detector (ALAD, XM82) and transition to ED under PE 6.47.25.A. AD will be continued on the Remote Sensing Alarm (SIREACH, XM21) and the Automatic Chemical Agent Detector and Alarm (ACADA, XM22). AD will be initiated on the Nuclear, Biological, Chemical Reconnaissance System (NBC RECON III).
- 4. (U) FY 1984 Planned Program: AD will be continued on the Remote Sensing Alarm (SCIREACH, XM21), Automatic Chemical Agent Detector and Alarm (ACADA, XM22), and NBC RECON III. AD will be initiated on the NBC Detector Remote which will be based upon laser principles and will be the second-generation remote sensor. It will be a principal part of the NBC RECON III.
 - 5. (U) Program to Completion: This is a continuing program.
 - 6. (U) Major Milestones: Not Applicable.
 - 7. (U) Resources (\$ in thousands):

RDTE	PY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	7130	10014	17892	20411	Continuing	Not Applicable

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Project: #D601
Program Element: #6.37.21.A
DOD Mission Area: #276 - Defensive Chemical and Biological Systems

Title: Chemical Detection and Warning Materiel
Title: Chemical Defense Materiel Concepts
Budget Activity: #4 - Tactical Programs

Funds (as shown in FY 1982	PY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
submission)	5659	10045	6063	-	Continuing	Not Applicable

Increase in FY 1981 (\$1471 thousand) was due to an extension of the AD program for the SCIREACH (XM21). The funding decrease of \$31 thousand in FY 1982 is the result of the smended budget request and the application of revised inflation indices. The increase in funding for FY 1983 (\$11,829 thousand) is due to an extension of AD for the SCIREACH (XM21); increased costs on ALAD (XM82) resulting from contract realignment to increase capability and initiation of AD for the NBC Recon III earlier than previously anticipated.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.23.A
DDD Mission Area: #344 - Tactical Command and Control

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

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

Project		FY 1981	FY 1982	FY 1983	FY 1984	Additional	Total Estimated
Number	Title	Actual	Estimate	Estimate	Estimate	To Completion	Costs
	TOTAL FOR PROGRAM ELEMENT	13880	20939	22133	41232	Continuing	Not Applicable
D101	Tactical Automation	13880	2933	4785	9691	Continuing	Not Applicable
D185	Military Software						
	Standardization	-	2837	3700	6064	Continuing .	Not Applicable
D186	Military Computer Family	-	13347	11865	13387	Continuing	Not Applicable
D192	Ada Joint Program Office	-	1822	-	-	-	-
D335	Communicative lechnology	-	-	1783	12090	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: In order to provide Commanders with needed near-realtime battlefield information, the fielding of survivable battlefield automated systems must be accelerated. To meet this goal, this program will provide a family of standard compatible computers and peripherals (Military Computer Family) and transportable software products and tools to include Ada, the standard DOD high order computer programing language. It will provide a family of multilevel secure operating systems and distributed processing techniques to increase battlefield survivability. It will provide computer resource management policy, procedures, regulations, and training to assure reduction of computer resource proliferation. The program provides for advanced development of video disk with microprocessor technology so that the potential large mass storage advantages of this medium can be infused into future tactical command and control applications as well as battlefield systems maintenance and training applications.
- C. (U) <u>BASIS FOR FY 1983 RDTE REQUEST</u>: These funds are essential to test and validate the MCF peripherals with the MCF computers, validate and evaluate the performance of the Ada compiler target code generator, provide a preliminary design of a family of multilevel secure standard realtime operating systems for MCF using Ada, assist developers to incorporate the Ada language and MCF in their systems as directed by DA policy, insure computer resource management (CRM) documentation is adequate, continue membership on NATO, Joint Service, and Army standardization panels, develop techniques for performance monitoring of a distributed system, and an R&D program for an improved secure network to improve battlefield survivability

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Program Element: #6.37.23.A

DOD Mission Area: #344 - Tactical Command and Control

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

and start of advanced development for automated information delivery systems which will use video disk and microprocessor technology to reduce dependency on manual processing for maintenance, traning, and technical materials.

Major Milestones	Current Milesto	ne Dates	Milestone Dat Shown in PY 1	es 982 Submission
Complete development of Ada Language System Targeted to Host Computer	FY	83*	3Q FY	82
Target Ada Language System to MCF	FY	83	PY	82
Initiate Development of a Family of MCF Operating Systems	FY	82	FY	82
Develop additional code generators for Ada language system	FY	83**	FY	83
Development Test for Advanced Development Models for MCF	FY	83	FY	83

- * Targeting to host computer entailed added time beyond FY 1982 estimate.
- ** First code generator to be completed in FY 1983; subsequent code generators will be developed in response to requirements from future Ada users.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	W 1061	ww. 1000		Additional	Total Estimated
RDTE	FY 1981	FY 1982	FY 1983	To Completion	Cost
Funds (current requirements) Funds (as shown in FY 1982	13860	20939	22133	Continuing	Not Applicable
submission)	11978	22008	27182	Continuing	Not Applicable

Increase in FY 1981 is due to command reprograming for D186, Military Computer Family; decrease in FY 1982 is due to changes in inflation indices and Congressional action. FY 1983 decrease is due to reprioritization actions within DOD and the

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Program Element: \$6.37.23.A

DOD Mission Area: \$344 - Tactical Command and Control

Budget Activity: \$4 - Tactical Programs

discontinuance of D192, Ada Joint Program Office. The Ada Joint Program Office is now funded within Air Force programs, PE 6.32.26.F.

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

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Program Element: #6.37.23.A

DOD Mission Area: #344 - Tactical Command and Control

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

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program provides for advanced development of software products (including the Department of Defense common high-order programing language, Ada) to more efficiently produce standardized software for tactical automated systems. Standardized configuration management aids will be used to specify and implement multiprocessor and microprocessor systems. Techniques, procedures, and tools will be provided for the detection, control, and rapid correction of failures in deployed software thereby reducing required skill levels in the field. Program provides for advanced development of a standard compatible family of military computers (MCF) and MCF peripherals including displays, hard copy devices, secondary and auxiliary storage media, intelligent terminals, and a communications interface to insure survivable battlefield command and control systems. Research and development to validate distributed processing techniques and multilevel secure software for more survivable systems will also be performed. This program ensures that required training and support are provided to system developers and other Army organizations in the development and acquisition of tactical systems using computer resources. Program provides resources for tailoring video disk technology to military needs; communicative technology addresses the electronic distribution and use of technical material used by both combat support and combat service support units—a by-product of this effort will permit faster, more efficient distribution, maintenance, and use of training materials.

G. (U) RELATED ACTIVITIES: This project is related to all Army battlefield automation systems, since it will provide a standard family of computers, peripherals, and selected software for those systems. The instruction set architecture, NEBULA, to be used in MCF is under joint Air Force-Army management and control. MCF is an Army computer standardization project oriented to the technologies of 1984 and beyond with provision for continuing competition and technology insertion. In this regard, there is a close relationship between the MCF Project and the Very High Speed Integrated Circuits (VHSIC) Program (62704F). Related programs being carried on by the other services are the Navy's Naval Embedded Computer System (NECS) and AN/AYK-14 Programs, and the Air Force's MIL-STD-1750 Program. Activities of the other services are carefully studied to avoid duplication. This project is related to the Army Field Artillery Tactical Data Systems (AFATDS), 2.37.26.A; Communications Electronics, 6.27. 6.27.01.A; Tactical Automation Technology, 6.27.46.A; Automatic Test Support Systems, 6.47.46; Missile Minder (AN/TSQ-73), 6.41.02.A; and other Command and Control programs by developing new technology, tools, equipment, interfaces, and systems engineering for these systems. An Ada Joint Program Office (AJPO) has been established by the Under Secretary of Defense for Research and Engineering to manage the common Ada effort. The Army's Ada effort has been coordinated with AJPO and received their acceptance that there is no unnecessary duplication of effort among Army, the other Services, or the Department of Defense (DOD). Coordination to avoid duplication and provide guidance is accomplished through the Department of Defense Computer Resources Technology Panel of the Management Steering Committee for Embedded Computer Resources, meetings between project managers of services and agencies, and DOD reviews.

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Program Element: \$6.37.23.A DOD Mission Area: \$344 - Tactical Command and Control

Title: Command and Control

Budget Activity: #4 - Tactical Programs

H. (U) WORK PERFORMED BY: Carnegie-Hellon University, Pittsburgh, PA; Softech, Inc., Waltham, NA; WICAT, Inc., Oren, UT; New York University, New York, NY; Teledyne Brown Engineering, Huntsville, AL; Higher Order Software, Cambridge, MA; EG&G, Rockville, MD; Computer Sciences Corp, Hoorestown, NJ and Falls Church, VA; IBM, Oswego, NY; General Electric, Syracuse, NY; Raytheon, Sudbury, MA; RCA, Hoorestown, NJ. Contracts will be awarded in FY82 to develop a secure realtime operating system family for MCF, and an in-house MCF validation system. It is estimated that contracts totaling \$19.3 million will be awarded in FY 1982. In-house development is performed by the US Army Communications Electronics Command, Fort Hommouth, NJ, and the Army Communicative Technology Office, Fort Eustis, VA.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Revised technical and acquisition strategies were developed for the Military Computer Family to reduce risk and enhance industry interest. Experimental evaluations were conducted of existing architecture to determine performance on military problems. As advanced architecture, Nebula, oriented to higher order language and to resitime computation was designed. On 10 April 1981, 30-month Advanced Development Contracts were awarded to General Electric, 18M, Raytheon, and RCA for the competitive development of the AN/UYK-41 super minicomputer, the AN/UYK-49 microcomputer, and the Single Module Computer (a removable element from the AN/UYK-49). A contract to develop the Ada language system has been awarded to Softech, Inc. A contract was awarded to provide a training device for the writing and execution of Ada programs. A Software Development Support System (SDSS) was established to certify all software products and tools for Army software support centers. The microprogrammable multiprocessor (MMP) system was interfaced to the ARPANET, demonstrating the capability for worldwide rapid post-deployment support. An Army-wide Post-Deployment Software Support study was conducted and a concept and implementation plan developed. Participation was provided to NATO, joint service panels, and Army software conferences, panels, and symposia as well as in planning the Army implementation of DOD Directive 5000.29, Management of Computer Resources in Major Defense Systems. A revised standard (MIL-STD-1462A) was prepared as a test programing language for Automatic Test Equipment (ATE) Systems. Work progressed on a maintenance information delivery system. A cost algorithm and design guide was developed for a Test Program Set (TPS).
- 2. (U) FY 1982-FY 1984 Program: The Military Computer Family (MCF) effort was consolidated into its own project in FY 1982, b186 (under PE 6.37.23.A). Military Software Standardization was also consolidated into its own project in FY 1982, b185 (under 6.37.23.A). Development of the Ada Language System will be completed as well as additional target generators and software tools. Validation, verification, and testing of the Ada language will continue. Development of an Ada code generator for the MCF computer will be initiated. Products and tools of the Ada language will continue to be improved and

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Program Element: #6.37.23.A

DOD Mission Area: #344 - Tactical Command and Control

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

supplied to other users. Formalization of training programs on Ada will be completed. Efforts in developing automated requirements methodologies will be continued and tested to insure acceptance by the combat developer. Development of Life Cycle Support Standards and Guidelines will be initiated. The Software Development Support System (SDSS) will continue to evolve into a development and life cycle support system. The transition of existing support software to the SDSS will be completed. An initial multilevel secure operating system for MCF will be developed; the MCF prototypes will be validated in-house. An independent development test will be performed on the MCF. Competitive advanced development contracts will be initiated for MCF peripherals. Assistance will be given to project managers by defining and developing software aids for the life cycle support of their systems. Support for the integration of primary tactical data and feeder systems will be continued, and system engineering support to satisfy MCF requirements will be expanded. Participation on NATO, joint service, and Army panels involved with computer resource management and standardization will continue. The DARCOM Post-Deployment Software Support Concept Plan will be expanded. Distributed processing and data processing techniques to promote survivability for battlefield functional areas will be developed. This includes developing an Experimental Distributed Processing Fac' (ty and the techniques for performance monitoring of a distributed system. A secure ARPANET and AUTODIN II interface to the microprogramable multiprocessor will be provided. A prototype of an integrated network of tactical mission-critical computer resources and means to provide quick-reaction support to the field will be developed. This period will capture developments being advanced by industry in communicative technology and incorporate them into military prototype field tests; voice technology applications will be validated.

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

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D186 Title: Military Computer Family (MCF)
Program Element: #6.37.23.A Title: Command and Control
DOD Mission Area: #344 - Tactical Command and Control
Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Computers have become an essential part of Army battlefield systems that perform the functions of communications, command and control, intelligence analysis, surveillance, target acquisition, air defense, weapons control, fire support, electronic warfare, navigation, equipment control, and combat support services. The necessary growth in the use of automation has resulted in an extensive proliferation of different and incompatible computer types. The Army has become seriously concerned that this proliferation will adversely affect survivability (ability to keep computers functioning in wartime), and will increase significantly the cost and complexity of software development and support as well as hardware logistics, maintenance, training, and acquisition. The goals of the Hilitary Computer Family (MCF) are to make automation survivable, supportable, and affordable. The Army has established policy and a transition plan for the use of a software-compatible Military Computer Family (MCF) in future systems and has initiated development of this family. Members include a super-minicomputer (AN/UYK-41), a microcomputer (AN/UYK-49), and a single-board computer (which is required to be a component of the AN/UYK-49). To assure survivability, computers will be ultra-reliable, have extensive built-in test capabilities, and be able to function in harsh environments. All hardware will employ standard interfaces and will be software-identical and fully plug-compatible in order to support distributed processing, graceful degradation, and mobility of software. The ready availability of replacement parts, maintenance supports, and a high population of identical units will further enhance survivability. To avoid technological obsolescence, multiple five-year production phases are planned. Advanced technology will be introduced in each phase (via competitive, streamlined development) while maintaining upward compatibility of instruction set and interfaces. For the first phase (now underway), 1984 technology will be used for the production which is to start in 1986. To insure real competition that is sustained throughout the acquisition life-cycle, the following strategy will be pursued: Each phase will start with an open solicitation for advanced development for which four competitive contracts will be awarded. Areas of competition will be: technology, hardware architecture, reliability, maintainability, life-cycle costs, power dissipation, size, weight, producibility, military specification environment, speed, and memory capacity. Each contractor will deliver prototype hardware. Two of these contractors will be selected to continue the competition through full-scale development, which will involve delivery of preproduction models and integrated logistics support packages. Finally, a five-year fixed price requirements-type production contract will be awarded to one of these contractors based on a competitive fly-off. The advanced 32-bit Army and Air Force instruction set called Nebula (MIL-STD-1862) will be used throughout MCF to insure software compatibility. Nebula is a modern, government-owned instruction set that was designed highly efficiently for military realtime systems and to support multilevel security. (This efficiency will reduce memory requirements and permit faster computation with less hardware.) Further, Nebula is oriented toward high order languages, and was specifically optimized for the new DOD language, Ada. This project slso includes the competitive development of a range of advanced peripheral devices that are fully compatible with the computer family.

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Project: #D186
Program Element: #6.37.23.A
DOD Mission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

- B. (U) RELATED ACTIVITIES: This project is related to all Army battlefield systems employing automation as it will provide an advanced family of computers and peripherals for such systems. Related exploratory development work is conducted under 6.27.01.A, Tactical Automation Technology. The full-scale development portion of the program falls under 6.47.27.A. Related efforts within 6.37.23.A are the Ada Language System and the Multi-Level Secure Tactical Operating System. Ada efforts are coordinated and managed by the DOD Ada Joint Project Office. The instruction set to be used in the MCF is under joint Air Force-Army management and control based on a Memorandum of Agreement (12 September 1980) between the Air Force Systems Command and the Army Materiel Development and Readiness Command. The DOD management Steering Committee for Embedded Computer Resources coordinates all service computer standardization programs. The Navy's NECS and AN/AYK-14 Programs and the Air Force's MIL-STD 1750 Program are related efforts that address needs and timeframes different from those of MCF. There is no unnecessary duplication of effort among these programs. MCF is the only DOD computer standardization project oriented to the technologies of 1984 and beyond with provision for continuing competition and technology insertion.
- C. (U) WORK PERFORMED BY: Primary contractors are General Electric Co., Syracuse, NY (teamed with TRW, Inc, Redondo Beach, CA); IBM Corp, Oswego, NY; Raytheon Co, Sudbury, NA; RCA, Moorestown, NJ; EG&G, Rockville, MD; Carnegie-Mellon University, Pittsburgh, PA; General Research Corporation, McLean, VA; and Research Triangle Institute, Durham, NC. The in-house developing organization responsible for the project is the US Army Communications-Electronics Command, Fort Monmouth, NJ.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Prior accomplishments were funded by 6:27.01.A (A094) and 6:37.23.A (D101). They are included here for continuity. An advanced instruction set architecture (ISA), called Nebula, was designed in 1979 (with the help of industry and the other Services) and became MIL-STD-1662 in May 1980. Nebula came under joint Air Force-Army control based on the 12 September 1980 Memorandum of Agreement. The joint Nebula Control Board, established in November 1980, fine-tuned and evolved Nebula with significant support from the Services, Carnegie Mellon University, EG&G, the Electronic Industries Association, the MCF hardware development contractors, and the Ada community. In September 1981, the Nebula Control Board approved MIL-STD-1862A, the final standard to be used for hardware development. Development of a prototype secure operating system kernel for Nebula is near completion. Four contracts totaling \$27 million were awarded to GE (with TRW), IBM, Raytheon, and RCA in April 1981 for competitive advanced development of all of the computers of the MCF. A facility for acceptance testing of MCF computers was planned and procurement initiated. Design of the MCF life-cycle cost model, to be used in analysis of competitive development approaches, was completed.
 - 2. (U) FY 1982-FY 1984 Program: In FY 1982, the four contractors competing the MCF hardware development will complete

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Project: #D186

Program Element: #6.37.23.A

DOD Mission Area: #344 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs

3. (U) Program to Completion: Advanced development of computer peripherals will be completed and will transition to full-scale development, 6.47.27.A, (D187). Next phase development of computers will continue. This will be a continuing effort to permit the award of new competitively based (from AD forward) production. Contracts are on a five-year cycle in order to avoid technological obsolescence and sole-source lock-in.

4. (U) Major Milestones:

Major Milestones	Milestone Dates	Milestone Dates Shown in PY 1982 Submission
Award of Competitive Advanced Development		
Contracts for the MCF	Apr 81	Apr 81
Final Instruction-Set Architecture (Nebula) Standardized (MIL-STD-1862A)	Nov 81	Nov 81
Technology Insertion Plans	Jan 82	Jan 82
Functional Designs of MCF	Jun 82	Jun 82

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Project: #D186

roject: #D186 Title: Military Computer Family (MCF)
Program Element: #6.37.23.A Title: Command and Control
DOD Mission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
MCF Test Facility Operational	Dec 82	Dec 82
Delivery of AD Models of MCF	Jan 83	Jan 83
DT I Completed	Jul 83	Jul 83
Technology Insertion Design	Oct 83	Oct 83
Initiative of Next Cycle AD of MCF Computers	Jun 84	Jun 84
Delivery of AD Models of MCF Peripherals	Jan 85	Not Shown

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

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (Current Requirements)	0	13347	11865	13387	Continuing*	Not Applicable
Funds (as shown in FY 1982 submission)	0	13386	13214	-	Continuing	Not Applicable

*The MCF Program includes cyclic developments in order to avoid sole-source lock-in and technical obsolescence. This is the reason that the project is described as continuing.

The reduction in Fy82 was due to use of adjusted inflation and civilian pay pricing indices. The decrease in FY83 is due to Office of the Secretary of Defense reprograming action.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.26.A

DOD Mission Area: 1213 - Land Combat Engineer Support

Title: Combat Support Equipment

Pudget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 5736	FY 1982 Estimate 6707	FY 1983 Estimate 8113	FY 1984 Estimate 13781	Additional To Completion Continuing	Total Estimated Costs Not Applicable
DG01	Combat Engineer Equipment	2687	3209	5964	9131	Continuing	Not Applicable
DG14	Container Distribution						
	Equipment	128	203	122	1384	Continuing	Not Applicable
DK39	General Support Equipment	0	555	0	1290	Continuing	Not Applicable
DK41	POL Distribution Systems	1497	1700	941	1034	Continuing	Not Applicable
D428	Tactical Rigid-Wall Shelters	1424	1040	1086	510	Continuing	Not Applicable
D471	Camouflage	0	0	0	432	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army requires new and advanced land combat service support equipment to meet the logistics support and mobility requirements of the current and future battlefield. The effectiveness and survivability of the combat forces in a hostile situation are highly dependent on supply capabilities. Vital cargo such as fuel, ammunition, food, water, and medical supplies must be delivered to field units in the required quantities, at the right time and location, and in useable conditions. Increased use of commercial containerships and fuel tankers to efficiently handle the large volumes of supplies requires military equipment capable of offloading, transporting, and handling containerized cargo and bulk fuels. Providing essential logistics resupply equipment is a primary objective of this program. This program also provides material that will increase the Army's tactical mobility, increase battlefield survivability, and reduce the logistics burden. New tactical bridging will improve capabilities for crossing rivers and other natural barriers. A containerized ammunition loading system will provide a capability for sustained rapid outloading of ammunition containers. New water purification equipment will efficiently provide potable water from any source, including nuclear-, biological-, and chemical-contaminated environments. The myrisd of existing vans and shelters of various sizes and types will be replaced by a new family of multipurpose tactical shelters. New hardened shelters will protect sophisticated communication/electronic equipment against nuclear, ballistic, and chemical/biological threats. New environmental control equipment (heating/air-conditioning) that is more efficient and highly reliable will be provided.

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Program Element: #6.37.26.A

DOD Mission Area: #213 - Land Combat Engineer Support

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

C. (U) BASIS FOR FY 1983 RDTE REQUEST: Funding is required to conduct Advanced Development (AD) of major components and subsystems for assault and tactical bridging; access and egress systems for present inventory bridging; means to detect clandestine tunnels dug by hostile forces; components for a system to rapidly load ammunition into containers; bulk fuels/distribution equipment to include large-capacity fabric storage tanks, rapidly emplaceable pipeline, low-temperature fuel dispensing, flexible hoseline, and field blending of fire-resistant fuels; equipment for cooling drinking water and monitoring water quality; a family of expandable and nonexpandable tactical shelters; and kits to provide protection for tactical shelters against nuclear, ballistic, and chemical/biological threats.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	5736	6707	8113	Continuing	Not Applicable
Funds (as shown in FY 1982					
submission)	5978	6720	8303	Continuing	Not Applicable

The reduction of \$242 thousand in FY 1981 funding level is a net result of an increase of \$960 thousand in Project D428 to accelerate development of electromagnetic interference and chemical/biological agent protection kits for Army shelters and reprograming from other projects to higher priority Army requirements.

The funding decrease of \$13 thousand in FY 1982 is a result of the amended budget request and the application of revised inflation indices.

The reduction of \$190 thousand in FY 1983 funding is the net result of an increase of \$2611 thousand to support restructuring the tactical bridging program and reductions in other projects to fund higher priority Army programs.

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Program Element: #6.37.26.A

DOD Mission Area: #213 - Land Combat Engineer Support

Title: Combat Support Equipment
Budget Activity: 44 - Tactical Programs

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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Program Element: #.37.26.A

DOD Mission Ares: #213 - Land Combat Engineer Support

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

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program supports Advanced Development (AD) of various items which are essential to the Army to provide the land combat support functions during combat and contingency operations. Included are: capabilities for rapid combat engineer construction; resupply of increasingly greater amounts of containerized cargo; mobile water purification units and water distribution equipment; environmental control for shelters and vehicles housing critical electronic equipment and personnel in all climates; resupply of bulk fuels, oils, and lubricants (POL); and tactical shelters to replace existing vans.
- G. (U) RELATED ACTIVITIES: Coordination to avoid duplication and provide program guidance is accomplished through the Department of Defense Joint Container Steering Group, the Joint Committee on Tactical Shelters, the Program Advisory Group for Rulk Petroleum Fuels Distribution, the Water Resources Hanagement Action Group, and the DOD Executive Agent for Land-Based Water Resources. Related Exploratory Development programs are in Program Element (PE) 6.27.23.A, Clothing, Equipment, and Shelter Technology, and PE 6.27.33.A, Mobility Equipment Technology. Items in this PE progress to Engineering Development in PE 6.47.17.A, General Combat Jupport.
- H. (U) WORK FERFORMED BY: In-house efforts are performed by the US Army Mobility Equipment Research and Development Command, Fort Belvoir, VA, and the US Army Natick Research and Development Command, Natick, MA. Current contractors include Pacific Car and Foundry, Renton, WA; Automatic Truck Loading Systems, Inc., Carlisle, PA; Airesearch Hanufacturing Company, Phoenix, AZ; Foster-Miller Associates, Incorporated, Waltham, MA; ICO Positive Seal Corporation, Odessa, TX; Goodyear Aerospace Corporation, Akron, OH; ILC Dover, Frederica, DE; Albany International Research Co., Dedham, MA; Southwest Research Institute, San Antonio, TX; Budd Co. Technical Center, Fort Washington, PA; Donaldson Co., Minneapolis, MN; Fiber Sciences, Salt Lake City, UT; Fiber Materials, Biddeford, ME; Exxon Materials Div., Greer, SC; and US Geological Survey, Bangor, ME.

I. (U) PROCRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Year Accomplishments: Pessibility testing of the prototype bridging system developed under a United States-United Kingdom-Federal Republic of Germany tripartite program was completed. Structural tests were completed on prototype materials for access/egress systems. Development of composite materials and structural elements for lightweight bridging systems was continued. An earth resistivity technique for tunnel detection was evaluated. The Prestaged Ammunition Loading System design has been established consisting of a dunnage subsystem, a transfer vehicle, and a dock-mounted container loader. Testing of the dunnage subsystem for restraint of 105 and 155mm ammunition has been completed. Two

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Program Element: #6.37.26.A

DOD Mission Ares: #212 - Land Combat Engineer Support

Title: Combat Support Equipment
Rudget Activity: 44 - Tactical Programs

5,000-barrel collapsible fuel storage tanks were fabricated using a semiless weaving process. Design of a Petroleum Hoseline Systes has been completed and fabrication of a prototype system initiated. Prototype 200-gpm and 600-gpm turbine-engine-driven pumps designed for extreme cold weather operations have been tested in the Arctic. Fuel hoses and collapsible storage tanks have been fabricated using special low-temperature elastomers. Quick-connect pipeline couplings were fabricated and tested. An advanced development contract was awarded for a fire-resistant-fuel field mixing unit. Development of kits for interconnecting the Army family of shelters has been initiated to provide protection against electromagnetic interference and chemical agents.

- 2. (U) FY 1982 Program: Fabrication of a prototype access/egress system will be completed. Advanced development will be initiated on an assault bridge system for the heavy force and a wet-gap bridge for the light force. Evaluation of alternative tunnel detection techniques will be continued. Development of composite bridge members will continue. Design of the dock-mounted container loader for the Prestaged Ammunition Loading System will be initiated. Development testing of two 5000-barrel collapsible fuel storage tanks will be completed. Engineer design testing will be continued on components for low-temperature fuel dispensing systems. Development testing will be initiated on a prototype Petroleum Hoseline System. A hydraulic pipe joining machine will be fabricated and design tests initiated. Fabrication of a fire-resistant fuel field mixing unit will be initiated. Kits to provide chemical and biological agent and electromagnetic protection a d an interconnecting capability for tactical shelters will be designed and installed on a group of shelters. Prototype low-cost composite panels for the Army family of tactical shelters will be fabricated.
- 3. (U) FY 1983 Planned Program: Development tests on the tactical access/egress system will be completed. Evaluation of composite bridge structural members will be continued. Development of an assault bridge for the heavy force and a wet-gap-crossing capability for the light force will continue. Developmental test models of tunnel detection subsystems will be acquired. Design of the entire Prestaged Ammunition Loading System will be completed. Advanced Development on the 5,000-barrel collapsible fuel storage tanks will be completed. Development testing of a hydraulic pipe joining machine will be conducted. Operational tests will be conducted on the Petroleum Hoseline System. Development of the fire-resistant-fuel field blending equipment will continue. Thermal and structural properties of composite panels will be evaluated for use in the Army family of tactical shelters. Advanced development of a 50-foot accordism shelter will be initiated. Advanced development of kits for interconnecting shelters will be completed.

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Program Element: #6.37.26.A

DOD Mission Area: #213 - Land Combat Engineer Support

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

A. (U) FY 1984 Planned Program: Advanced development of the tactical access/egress system will be completed and the program will transition to full-scale development. Selected composite structural elements will be integrated into tactical bridge designs. Prototypes will be fabricated for the tactical bridging for the heavy force and wet-gap bridging for the light force. The tunnel detection program will enter the developmental and operational testing phase. Fabrication of complete Prestage Ammunition Loading Systems for field operational evaluation will be initiated. Development will be initiated on a water quality conitor. Design of equipment for detection and rapid development and production of ground water will be initiated. Development will be initiated on a family of improved van air climate control systems. Developmental and operational testing of the low-temperature fuel-dispensing equipment will be completed. Design of an automatic pipeline construction equipment system will be completed and fabrication of a prototype system initiated. Barrier materials to improve the durability of the 50-foot accordian shelter will be evaluated. Methods of moving shelters in the field to facilitate inter-connection/complexing will be evaluated.

5. (U) Program to Completion: This is a continuing program. Specific items will progress to Engineering Development (ED) upon completion of Advanced Development (AD), and new AD efforts will be initiated upon identification of critical system requirements.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # DG01

Program Element: # 6.37.26.A

Title: Combat Engineer Equipment

rogram Element: # 6.37.26.A Title: Combat Support Equipment
DOD Mission Area: #213 - Land Combat Engineer Support Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: The existing Army bridging systems are deficient in several areas. The assault bridge used by the heavy divisions for gap crossings under fire is limited in span length. Other dry-gap-crossing systems are slow to emplace and recover and require excessive manpower. In addition, current bridging systems do not meet the needs of the emerging high-technology light force, particularly the strategic air mobility requirements. In view of the increased importance of the light highly mobile force, the key role of tactical bridging in insuring our mobility on the modern battlefield, and the many tasks (including but not limited to bridging) required of the combat engineer, faster, less labor-intensive bridging systems are needed to meet the needs of both the light and the heavy forces. To enhance the capabilities of new and existing bridging, a system is also being developed to improve access and agrees to tactical bridge sites. In addition to gap-crossing systems, this project supports the development of an improved system for the detection of enemy tunnels to reduce the vulnerability of critical defensive positions and sensitive installations to surprise attack.

- B. (U) RELATED ACTIVITIES: Related exploratory development work is being conducted under Program Element 6.27.33.A, Mobility Equipment Technology. Engineering development effort in the tactical bridging and tunnel detection areas is being accomplished under Program Element 6.47.17.A, General Combat Support. 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. Current contractors include Pacific Car and Foundry Co., Renton, WA; Fiber Science, Salt Lake City, UT; Fiber Materials, Biddeford, ME; Exxon Materials Division, Greer, SC; Southwest Research, San Antonio, TX; and US Geological Survey, Bangor, ME.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Technical feasibility testing of the prototype bridging system developed under the tripartite (United States-United Kingdom-Germany) development program was completed. Budgetary constraints in the UK and GE and a recent assessment of current tactical bridging requirements by all participants led to the decision to conclude the trilateral (UK-US-GE) development effort. The three nations intend to continue to maintain contact at the technical level to sustain existing interoperability and strive for its expansion. Structural tests were completed on prototype surface material for the crossing-site access/egress system. A bridge girder bottom chord was successfully manufactured

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Project: # DG01

Title: Combat Engineer Equipment

Program Element: # 6.37.26.A Title: Combat Support Equipment
DDD Mission Area: #213 - Land Combat Engineer Support Budget Activity: #4 - Tactical Programs

using organic composite materials, and the structural element was subjected to testing to determine its load-carrying capabilities. Development was initiated on using composite materials for tensile elements and web modules. Successful development of composite material structural components will lead to increased span length and load-carrying capacity by reducing the weight of the bridge structure and its launching mechanism. Final technical evaluation of the earth resistivity subsystem of the tunnel detection system was initiated.

- 2. (U) FY 1982 Program: The design and fabrication of the prototype access/egress system will be completed. Advanced development is scheduled to begin on a new assault bridge for the heavy force and a wet-gap-crossing capability for the light force. Design and fabrication of web and tensile elements using composite materials will be completed. Technical evaluation of the earth resistivity and the improved seismic listening subsystems of the tunnel detection system will be completed.
- 3. (U) FY 1983 planned Program: Developmental test I of the prototype tactical crossing site access/egress system is scheduled to be completed. Testing and evaluation of the composite material structural elements, (web, tensile elements and bottom chord) is expected to be completed. Advanced development will be continued on the new assault bridge for the heavy force and on an improved, wet-gap-crossing capability for the light force. Developmental test models of the improved earth resistivity and improved seismic listening subsystems of tunnel detection system will be acquired and, with other related subsystems, readied for Developmental Test 1.
- 4. (U) FY 1964 Planned Program: Operational lest I of the prototype tactical crossing site access/egress system is scheduled to be accomplished and the documentation assembled for decision review to proceed into full-scale engineering development. Selected composite structural elements that successfully completed testing will be integrated into emerging tactical bridging system designs. The evaluation of lightweight, high-strength composite and metal matrix materials will continue and be extended to include other bridging structural components. Prototypes will be fabricated of the assault bridge for the heavy force and the improved wet-gap-crossing system for the light force. Developmental Test (DT) I and Operational Test (OT) I of the improved tunnel detection system are scheduled to be accomplished.
 - 5. (U) Program to Completion: This is a continuing program.
 - 6. (U) Major Milestones: Not applicable.

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Project: # DGO1 Title: Combat Engineer Equipment
Program Element: # 6.37.26.A Title: Combat Support Equipment
DOD Mission Area: #213 - Land Combat Engineer Support Budget Activity: #4 - Tactical Programs

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
RDTE Funds (Current requirements)	2687	3209	5964	9131	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	2789	3217	3353	~	Continuing	Not Applicable

- (U) The decrease of \$102 thousand in FY 1981 funding level is the result of reprograming to higher priority Army requirements.
- (U) The decrease of \$8 thousand in FY 1982 funding is the result of the amended budget request and the application of revised inflation indices.
- (U) In FY 1983, an increase of \$2611 thousand is required to fund advanced development of a wet-gap-crossing capability for the light force and a new assault crossing system for the heavy force to meet recently identified user needs for new tactical bridging.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SURGIARY

Program Element: #6.37.30.A

DOD Mission Area: #342 - Surveillance and Reconnaissance

Title: Tactical Surveillance System
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT	10282	14984			Continuing	Not Applicable
D560	Tactical Surveillance System	10282	14984			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 advanced development 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 enemy forces at maximum range to insure that a manageable combat power ratio exists in the main battle area. The tactical commander must also have the capability to seize the initiative from the enemy by blunting his strength and exploiting his weaknesses. 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 1983 RDTE REQUEST: Continue Advanced Development (AD) work on hardware/software interfaces between existing and future strategic and theater sensor systems and Army tactical exploitation systems. Continue Interim Tactical

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Program Element: #6.37.30.A

DOD Mission Area: #342 - Surveillance and Reconnaissance

Title: Tactical Surveillance System

Budget Activity: #4 - Tactical Programs

Imagery Exploitation System (ITacIES) development. Conduct TacIES system/subsystem tests and demonstrations in conjunction with tactical exercises to assess the performance gains resulting from the use of new tactical surveillance systems. Begin operator training for ITacIES.

COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	PY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	10282	14984		Continuing	Not Applicable
submission)	10811	15030		Continuing	Not Applicable

The FY 1981 reduction is based on a Congressionally approved reprograming action. The FY 1982 decrease is due to the application of revised inflation and civilian pay pricing indices. The FY 1983 decrease is due to program realignment.

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

Program Element: #6.37.30.A

DOD Mission Area: #342 - Surveillance and Reconnaissance

Title: Tactical Surveillance System
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 and data compression technologies, and tactical identification and positioning. The use of satellite communications is being considered. This work is coordinated with appropriate departments and agencies. Program Element (PE) 6.47.40 (Tactical Surveillance Systems) covers engineering development (ED) work which is related to this program.
- H. (U) WORK PERFORMED BY: RCA Corp., Camden, NJ; Aerospace Corp., El Segundo, CA; US Army Electronics Research and Development Command (ERADCOM), Adelphi, MD; Ford Aerospace Corp., Palo Alto, CA; Systems Planning Corp., Arlington, VA; MRJ, Inc., McLean, VA; DBA, Inc., Melbourne, FL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: The systems interface elements for a demonstration system, the Digital Imagery Test Bed (DITB), interfacing with one collection system were completed and tested. Necessary experimental work was completed, and the DITB was prepared for an engineering demonstration. The Engineering demonstration was completed in fall 1979. Demonstration in a tactical environment (Reforger Exercise) was completed in fall 1980. System development for interface with a second collecton system was continued. Advanced development (AD) of subsystems for an advanced exploitation system was continued. The DITB was deployed to the XVIII Airborne Corps, Ft Bragg, NC, for further operational evaluation. Specifications were developed for an Interim Tactical Imagery Exploitation System (ITacIES) based upon analysis of FY80/81 demonstrations and operational evaluation results.
- 2. (U) FY 1982 Program: Improved communications and interfaces with the Interim Tactical ELINT Processor (ITEP) and All Source Analysis System (ASAS) will be developed. Development of an Interim Tactical Imagery Exploitation System (ITacIES) will begin. Software development for tactical exploitation of TR-I/Advanced Synthetic Aperture Radar System (ASARS) data in ITacIES will continue in coordination with USAF. The DITB will be used to evaluate operational concepts and techniques developed for ITacIES and to evaluate operator/system interfaces. Software development to integrate data from a developing national sensor will begin.

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Program Element: #6.37.30.A

DOD Mission Area: #342 - Surveillance and Reconnaissance

Title: Tactical Surveillance System
Budget Activity: #4 - Tactical Programs

- 3. (U) FY 1983 Planned Program: Development of the Interim Tactical Imager/ Exploitation System (ITacIES) will continue. Software development for tactical exploitation of TR-1 Advanced Synthetic Aperture Radar System (ASARS) data in Tacies will continue. The Digital Imagery Test Bed will continue to be used to evaluate operational concepts and techniques for ITacIES and to evaluate operator-system interfaces. Software development to integrate data from a developing national sensor will continue. Development of interfaces with the All Source Analysis System will continue. Operator training for ITacIES will begin.
- 4. (U) FY 1984 Planned Program: Two ITacIES will be deployed to tactical Corps, and operational evaluation will begin. TR-1/ASARS demonstrations and operational evaluations will be supported. Software development for integrating data from a new national sensor will continue.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.32.A

DOD Mission Area: #215 - Land Warfare Support

Title: Combat Medical Materiel
Budget Activity: 4 Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	132	190	224	260	Continuing	Not Applicable
B836	Combat Medical Materiel	132	190	224	260	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element is the basis for advanced development required to field new and improved medical equipment essential to providing medically responsive field health care systems, espenially within the corps hospitals. These systems should be capable of handling large numbers and varieties of combat injuries in a highly mobile environment, and simultaneously decrease utilization of resources while easing the burden of Army field logistics through development of efficient medical support systems.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: These funds are necessary to advance the development of improved medical material for use by the field medical system and to initiate associated development efforts to configure corps-level hospitals in International Standards Organization/Tent, Extendible, Modular, Personnel (ISO/TEMPER) shelters.
- D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	PY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
ADTE Funds (current requirements)	132	190	224	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	132	190	225	Continuing	Not Applicable

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Program Element: #6.37.32.A

DOD Mission Area: #215 - Land Warfare Support

Title: Combat Medical Materiel
Budget Activity: #4 Tactical Programs

The funding decrease of \$1000 in FY83 is a result of revised inflation indices.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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Program Element: #6.37.32.A

DOD Mission Area: #215 - Land Warfare Support

Title: Combat Medical Materiel
Budget Activity: #4 Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: The need for tactical flexibility in modern warfare and new weapon developments has increased the problems and complexity of diagnosing and treating large numbers of devastating combat injuries. This program is an aggressive research effort to develop new and improved medical field equipment in areas such as diagnostic and special-purpose equipment and treatment and evacuation equipment. Special emphasis is placed on simplicity for use by nonprofessionals, mobility to minimize burdens on the combat logistical system, and utility under a variety of environmental conditions.
- G. (U) RELATED ACTIVITIES: The program contains items and systems that have progressed to advanced development from related exploratory development Program Element 6.27.72.A, Combat Casualty Treatment Technology. Related Engineering Development Program Element is 6.47.17.A, General Combat Support, Project D832, Combat Medical Materiel. Army development is closely coordinated with Air Force, Navy, and other agencies' medical material development programs via formal symposia and informal contacts to insure that there is no duplication.
- H. (U) WORK PERFORMED BY: All work is performed in-house by the US Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, Frederick, Md.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Two lists of tests for the field clinical analysis system were developed and validated. Commercial companies have been surveyed as to the possibility of providing similar materials for comparison testing. The spine boards were transferred to engineering development and type classified. The modification of the surgical scrub sink was successfully completed and submitted to the procuring activity (DPSC) for action.
- 2. (U) FY 1982 Program: Commercially available clinical analysis equipment will be compared to the proposed field clinical system and its components, and a practical field system will be developed. The form/fit/function studies of ISO Shelters/TEMPER Tent Field Hospital and configurations will begin.
- 3. (U) FY 1983 Planned Program: A request for proposal for the field clinical analysis system will be advertised; evaluation of responses and awarding of a contract is planned. The low-dose X-ray system is scheduled to move into the prototype development phase. The form, fit, and function studies to configure the lists of equipment in the medical sets, kits, and outfits (SKO) into ISO/TEMPER shelters associated with development of corsp-level hospitals are to be done. These will identify to the lead Laboratory (NLABS), The Academy of Health Sciences (AHS), and OTSG specific medical requirements for equipping these shelters (plumbing, medical gases, waste, electrical distribution, suction, heating and air conditioning, etc.,) and identify and locate the positioning of mounting hardware for installed equipment.

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Program Element: #6.37.32.A

DOD Mission Area: #215 - Land Warfare Support

Title: Combat Medical Materiel
Budget Activity: #4 Tactical Programs

- 4. (U) FY 1984 Planned Program: The Steam Vacuum Pulse/Ethylene Oxide Sterilization Systems, medical gas generation systems, field gurney, and the vital signs monitors for high-noise environment are candidates to be transferred into advanced development. Other requirements will undergo product improvement or new development as required.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.40.A

Title: Division Air Defense Command and Control (SHORAD-C2 System)

DOD Mission Area: #222 - Ground-Based Antiair Budget Activity: #4 - Tactical Programs and Tactical Missile Defense

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 12029	FY 1982 Estimate 9171	FY 1983 Estimate 4399	FY 1984 Estimate 8344	Additional to Completion 211347	Estimated Cost 245499 2
D593	Short-Range Air Defense Command and Control (SHORAD-C ² System)	12029	9171	4399	8344	211347	245499

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Short-range air defense (SHORAD) command and control is provided through three major elements: A sensor to provide aircraft position data, command and controlling information provided by data processing subsystems to enhance the air defense system gunner's capability in effectively engaging the target, and a communications medium which provides for the exchange of controlling and sensor information. The present manual SHORAD command and control system furnishes these elements with marginal to unacceptable effectiveness. When considering the improved short-range air defense weapon capabilities and the increased capability of threat aircraft, the present command and control system does not support the force commander's requirement to manage air defense and use weapons effectively. The shortfalls in the flow of air battle information result in alow, error-prone dissemination of airspace control orders by SHORAD commanders, incomplete and inaccurate engagement information to SHORAD gunners, and untimely and inaccurate sensor data to the entire system. The impact of these shortfalls causes missed opportunities to engage enemy aircraft, the useless expenditure of air defense munitions through the simultaneous engagement of a single aircraft by two or more weapon systems, and increased risk to friendly aircraft. A new SHORAD command and control system is necessary to improve the effectiveness of SHORAD weapons and overcome present shortfalls by integrating weapons, sensors, and data devices into a functional system. This will be accomplished through the use of digital processing of target information, improved dissemination of air threat turning and weapon control orders, and the introduction of additional instrumentation to allow timely and accurate presentation of appropriate battle information at the gunner position. Data for Airspace Hanagement will be provided by the SHORAD C2 system to support the air space management element. An automated interface will be p

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Program Element: \$6.37.40.A

DOD Mission Area: \$222 - Ground-Based Antiair

and Tactical Missile Defense

Title: Division Air Defense Command and Control (SHORAD-C2 System)

Budget Activity: \$4 - Tactical Programs

information to be provided to other battlefield automated systems when they are fielded. To support earliest practical deployment of a viable command and control system that fulfills a near-term requirement, the maximum use of already-developed hardware will be investigated.

C. (U) BASIS FOR 1983 RDTE REQUEST: The requested funds are needed to conduct the Army in-house system definition which will provide the essential preparation for the Engineering Development (ED) phase. This system definition includes an activity schedule that started in 4th Quarter FY81. Requested funds are needed for operation, modification, and support of test system requirements, system configuration design alternatives, support of Cost and Operational Effectiveness Analysis (COEA), system modeling, critical experiments, test and evaluation plans (including test support hardware) Integrated Logistics Support (IIS) plans, ED source selection plans, and interface definition.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission 1/
Initiate System Design 1/	2Q80	2Q79
Concept Feasibility 1/ Demonstration	1Q81	4Q80
General Officer Review	3Q81	~
Complete System Alternatives Design 17	1Q83	3Q81
In-Process Review	1Q83	None
Request for Proposal for Engineering Development 1/	3Q83	None
Army Systems Acquisition Review Council 11 1/	1Q84	None
Engineering Development Award	2Q84	None En

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Program Element: #6.37.40.A

DOD Mission Area: #222 - Ground-Based Antisir

Title: Division Air Defense Command and Control (SHORAD-C2 System)

Budget Activity: #4 - Tactical Programs

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

1/ Program Schedule and milestones were changed in response to General Officer Review direction and direction from DA to conduct System Definition by Government laboratories.

D. (U) COMPARISON WITH FY 1962 RDTE Request: (\$ in thousands)

	FY 1961	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	12029	9171	4399	219691	245499
Funds (as shown in FY 1982 submission)	12029	13134	12562	26654	59117

The changes in FY82 and FY83 are due to reprograming to higher priority programs. The decrease in FY82 represents a change in program strategy directed by a General Officer Review.

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

	FY 1981 Actual	FY 1962 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army						
Funds (current requirements)	Ú	O	U	C	1292000	1292000
Funds (as shown in FY 1982						
submission)	0	G	33674	o	64959	98633
Quantities (current requirements)				20	20
Quantities (as shown in FY 1982 submission)					. 20	20

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Program Element: #6.37.40.A Title: Division Air Defense Command and Control (SHORAD-C2 System)

DOD Mission Area: #222 - Ground-Based Antisir and Tactical Missile Defense

Budget Activity: #4 - Tactical Programs

1/ The decrease in funding requirements in FY83 is because more development time is needed before procurement begins on a system which has acquired more requirements by the user. The increase in the "to completion cost" reflects the higher cost of a more complex system.

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Program Element: #6.37.40.A

DOD Mission Ares: #222 - Ground-Based Antisir
and Tactical Missile Defense

Title: Division Air Defense Command and Control (SHORAD-C2 System)
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: To fight and win on the battlefield in the 1980's, Short Range Air Defense systems require an integrated command and control (C2). A SHORAD Command and Control system will improve the effectiveness of SHORAD systems by providing precise and timely target information, including tentative target identification, to the SHORAD gunner. This will allow the gunner more time for positive visual identification, and allow engagement of targets in the forward aspect. The gunner's effectiveness in selecting only hostile targets for earliest possible engagement will be anhanced because he will be able to identify and engage targets before the targets pass overhead. This function, called "cueing," will be performed by acquiring target data from a sensor (radar), and transmitting that data to SHORAD gunners via a digital data link over Standard Army Radios. The architecture for the cueing system will be determined by the Concept Feasibility Demonstration planned to start in 10FY81. The sensor must have an automated capability for extracting target and transmitting target data with frequent updates as the target moves. The gunner must be furnished a device which will receive and display this improved target position data in such a way that the gunner can accurately determine target direction (at least within 10 degrees in eximuth). The SHORAD C2 system will also provide an improved interface between the SHORAD battalion and a nearby HAWK or Patriot battalion. This improved interface will be used to provide the second major function of the SHORAD C2 system, called "alerting." Alerting is described as warning all friendly ground forces of impending air attack so that those forces may take protective/defensive measures. This interface will be implemented by extracting information from the AM/TSO-73 fire distribution system at the HAWK battalion or from the Patriot Command/Control Set, transmitting that information by HF radios directly to several locations simultaneously in the SHORAD battalion, including the battalions' lisison elements at the maneuver units. Alerting information can be transmitted to the lower achelons by using FM radio nets within the maneuver units. The use of HF radios will greatly expedite this alerting information by aliminating several retransmissions of the data required by use of the shorter range over VHF radios. The alerting system may be automated or manual, as determined by the CDF. The alerting system, in addition to the function described above, will also expedite the transfer of general weapon control instructions from the NATO command through the Patriot or HAWK battalions to the SHORAD battalion. Once these weapon control instructions are within the SHORAD battalion, the cueing system will be used down to the SHORAD gunners. In the late 1980's, the SHORAD C2 system (both cueing and alerting) will be supported by the PLRS/JTIDS (Position Locating and Reporting System/Joint Tactical Information Distribution System) Hybrid. Air space data from over the division area, such as friendly sircraft position and ID, will be provided through the SHORAD C2 system to the Division Air Management Element (DAME).

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Program Element: #6.37.40.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: Division Air Defense Command and Control (SHORAD-C2 System)
Budget Activity: #4 - Tactical Programs

G. (U) RELATED ACTIVITIES:

System	Program Element #
Roland	6.43.09.A
Chaparral	2.37.30.A
DIVAD Gun	6.43.18.A
Vulcan	2.37.41.4
Stinger	6.43.06.A

The operation and/or configuration of the above systems will be directly affected by the SHORAD command and control system. Unnecessary duplication of effort will be avoided by continued direct contact and exchange of status information between and among the project offices involved.

H. (U) WORK PERFORMED BY: Program management will be performed by the Project Hanager, Air Defense Command and Control Systems (ADCCS), assigned to the US Army Missile Command (MICOM), Redstone Arsenal, Alabama. Concept Definition is being performed by the Army Missile Laboratory at MICOM. Other contracted efforts will be performed by competitively selected contractor(s). Modifications required for Air Defense weapons systems will be acquired through the office currently responsible for the hardware communications modifications contractor for that hardware.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The US Army Communications Research and Development Command (CORADCOM) and the US Army Air Defense School (USAADS) coordinated a study titled "Division Air Defense Command and Control Analysis," which concluded that operational effectiveness, reaction time, kill ratio, and aircraft identification could be improved with the introduction of automated command and control for SHORAD weapons. In-house efforts at CORADCOM were begun to define C2 systems, exploiting existing off-the-shelf hardware. CORADCOM allocated \$600K from program element 6.27.01.A, Project W92, Communications Technology, in FY 1979 to initiate a program that would lead to development of an improved SHORAD C2 system to meet urgent requirements in Europe and evolve into an "upgraded system" that could more fully exploit the capabilities of new Weapons systems. Concept development for the overall system was initiated. The SHORAD C2 Program was placed under management of the Project Manager, Air Defense Command and Control Systems, in FY79. In FY80 hardware and

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Program Element: #6.37.40.A

Title: Division Air Defense Command and Control (SHORAD-C2 System)

DOD Mission Area: #222 - Ground-Based Antiair

Budget Activity: #4 - Tactical Programs and Tactical Missile Defense

software were acquired to initiate a Concept Feasibility Demonstration. The Concept Feasibility Demonstration (CFD) demonstrated various architectures for cueing and for alerting. A General Officer Review revalidated the requirement and approved an acquisition strategy which included using the competitive process for sensor selection. Plans were developed to initiate the Army in-louse effort to support the Engineering Development Request for Proposal.

- 2. (U) FY 1982 Program: A DARCOM in-house effort will be initiated to refine system requirements; define system configuration alternatives; support the Cost and Operational Effectiveness Analysis (COEA) process and define test and evaluation and ILS requirements. Computer models will be developed and used in conjunction with critical experiments to define system interface requirements. Where appropriate, industry assistance will be solicited. All those efforts will support Project Manager, Air Defense Command and Control (ADCC), development of the RFP for ED. Long-leadtime Covernment-Furnished Equipment (GFE) to support the ED contractor(s) will be purchased.
- 3. (U) FY 1983 Planned Program: Continue DARCOM in-house efforts initiated in FY82 to support the competitive process for selecting the ED contractor(s). Additional long-leadtime GFE to support the ED contractor(s) will be purchased.
 - 4. (U) FY 1984 Planned Program: Selection and award of ED RFP's.
 - 5. (U) Program to Completion: Production of hardware is expected to support initial deployments in PY89.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.45.A

DOD Mission Area: #373 - Tactical Surveillance, Reconnaissance, and Target Acquisition

Title: Tactical Electronic Support Heasures (ESM) Systems
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4620	7381	-	•	Continuing	Not applicable
D925	All Source Analysis System	4620	7381	-	-	Continuing	Not applicable

- BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The past decade has witnessed major technical advances and the B. BRIEF DESCRIFTION OF ELEMENT AND MISSION NEED: The past decade has witnessed major technical advances and the introduction of increasingly sophisticated weapons and intelligence gathering systems into the strategic and tactical operations of military forces, both friendly and opposing. Army commanders at all echelons must have an intelligence system which will provide early detection, identification, and location of these enemy critical nodes in order to employ our own forces and weapons for effective enemy strition. This program supports completion of the advanced development of the Signals Intelligence/Electronic Warfare subsystem (SEMS) of the All Source Analysis System (ASAS), for operation of timely and effective combat intelligence and electronic warfare (EW) information and control of intelligence/EW assets.
- C. (U) BASIS FOR FY 1983 RDTE Request: Complete software and hardware development, integration and acceptance testing.
- COMPARISON WITH FY 1982 RDTE REQUEST (\$ in thousands): D.

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Program Element: #6.37.45.A

DOD Mission Area: #373 - Tactical Surveillance,

Reconnaissance, and Target Acquisition

Title: Tactical Electronic Support Heasures (ESN) Systems
Budget Activity: 44 - Tactical Programs

	FY 1981	PY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	4620	7381		Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	2621	7404		Continuing	Not Applicable

In FY 1982 and prior, this Program Element included project #D907 (Tactical Electronic Surveillance Systems). Project D907 funding profile is contained in Program Element 6.37.66A (Tactical Electronic Surveillance Systems). Increase in FY 1981 and 1983 is due to reprograming action to accelerate software development efforts. Decrease in FY 1982 due to inflation index change.

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

Program Element: #6.37.45.A

DOD Mission Area: #373 - Tactical Surveillance,

Reconnaissance, and Target

Acquisition

Title: Tactical Electronic Support Measures (ESM) Systems
Budget Activity: \$4 - Tactical Programs

- F. DETAILED BACKGROUND AND DESCRIPTION: Based on summer 1980 Congressional guidance to redirect the BETA project, the Services prepared a Joint Tactical Fusion Development and Acquisition Program Plan. It combines the Army Technical Control and Analysis Center (TCAC) projects, the All Source Analysis System (ASAS), and the Battlefield Exploitation and Target Acquisition (BETA) project with the Air Force Enemy Situation Correlation Element (ENSCE, formerly ATFD) in a joint program for the full-scale development and fielding of an ASAS for the Army and ENSCE for the Air Force. This program supports the ASAS development by providing for the advanced development and prototype fabrication of one Corps-level, five-shelter model of a Signal Intelligence/Electronic Warfare Subsystem (SEWS). The software developed and integrated into this Corps-level model is also required by the Technical Control and Analysis Center Division (TCAC-D). The TCAC-D is a Quick-Reaction Capability (QRC) program

 TCAC-D hardware procurement was accomplished with PY 1979 OPA funding. The Joint Tactical Fusion Acquisition Strategy is based upon an evolutionary approach that makes maximum use of current fusion-related efforts. It takes an existing software baseline, develops a compatible hardware set for the tactical environment, and provides for the incremental development of software tailored to User needs and experience. With the early

 fielding of TCAC-D, the project will be oriented to software improvements that address immediate User needs on the fielded TCAC-D or identified in User evaluation of the Corps Model SIGINT EW Subsystem (SEWS).
- G. (U) RELATED ACTIVITIES: The following current related Services/sgencies Program Elements (PE) apply: 6.43.21.F (Joint Tactical Fusion Program); 6.43.21.A (Joint Tactical Fusion Program); and 3.58.85G (Tactical Cryptologic Program). There is no unnecessary duplication of effort among the Services and agencies.
- H. (U) WORK PERFORMED BY: The major contractor for the current advanced development effort is RCA Corpo. ution, Burlington, MA. In-house developing organizations are: US Army Electronics Research and Development Comma.d (ERADCOM), Adelphi, MD; US Army Electronic Warfare Laboratory, Fort Hormouth, NJ; US Army Materiel Development and Readiness Command (DARCOM), Alexandria, VA, and the Program Manager, Joint Tactical Fusion Program.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: Advanced development of the Signal Intelligence/Electronic Warfare
Subsystem (SEMS) to support the development of the All Source Analysis System (ASAS) was initiated. The hardware is one
Corps-level, five-shelter prototype model. The software under development is applicable to both the Corps-level model and
the Technical Control and Analysis Center - Division (TCAC-D). The QRC TCAC(D) will be fielded

TCAC(D) hardware was provided with FY 1979 OPA funding. During 1981 two Corps model shelters were
delivered as well as a TCAC(D) software package for the terminals.

Program Element: #6.37.45.A

DOD Mission Area: #373 - Tactical Surveillance,
Reconnaissance, and Target
Acquisition

Title: Tactical Electronic Support Measures (ESM) Systems
Budget Activity: #4 - Tactical Programs

2. (U) FY 1982 Program: Emphasis in FY82 is on the software, which is the pacing factor in the TCAC(D) fielding and the completion of the Corps-level (SEMS) developmental effort. The software version required for the TCAC(D) deployment will be completed in May 1982 and followed by system acceptance testing in the May-September 1982 timeframe.

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- 3. (U) FY 1983 Planned Program: The special evaluation of TCAC(D) utilizing the deployment version of the Corp's model software will begin in October 1982 and deployment planned for 2nd quarter FY 1983. Hardware delivery, software integration, and acceptance testing of the Corp's model SIGINT EW subsystem (SEWS) will be completed in 2QFY83. The Corp's model will be employed to best support Army fusion requirements. Options range from continued User evaluation at Fort Hood, to training, to various deployment modes in a Division or Corps configuration. Regardless of the option chosen, continuing feedback into the All Source Analysis System (ASAS) development effort will be effected.
- 4. (U) FY 1984 Planned Program: The project will address planned software improvements essential to TCAC(D) operation. Other longer term user-identified needs will be factored into the development program for ASAS-Program Element 6.43.21A (Joint Tactical Fusion Program.)
- 5. Program to Completion: Same as paragraph 4 above. In addition, this program element will include development of an collection, analysis, and reporting system beginning in FY 1985.

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.46.A

DOD Mission Area: #345 - Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCGARS)
Budget Activity: 94 - Tactical Programs

A. (U) RESOURCES (Project Listing): (\$ in thousands)

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	25088	13682	17862	0	0	97484
D555	Single Channel Ground and Airborne Radio Subsystem (SINCGARS)	25088	13682	17862	0	0	97484

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the advanced development of the Very High Frequency (VHF) Single Channel Ground and Airborne Radio System (SINCGARS-V) and selected ancillary devices. SINCGARS is the future combat net radio (push-to-talk netted operations) replacing the current VRC-12 series, and is the primary means of communications for armor, artillery, and infantry forces. It is used primarily from brigade down to platoon. Configurations consist of manpack, vehicular, and aircraft. Larger and less mobile radios capable of communications via multichannels (12, 24, etc.) through the means of multiplexing equipment are not covered under this element. In addition to providing a radio with improved maintainability and reduced size and weight, SINCGARS-V will satisfy the need for a tactical radio system to operate in an electronic countermeasure (ECM) environment.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Funds are requested for the continuation of the SINCGARS-V contractual effort to include system test and evaluation of the Advanced Development Prototypes, internal support, and preparation for the next decision milestone in FY83. Funds are also requested for contract awards for Advanced Development of the Steerable Mull Antenna Processor (SNAP II), the Vehicular Intercom System, and Audio Transducers (earphones, microphones, loudspeakers) which will interface with the SINCGARS-V radio.

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Program Element: #6.37.46.A

DOD Mission Area: #345 - Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCGARS)
Budget Activity: #4 - Tactical Programs

SINCGARS-V Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY82 Submission		
Advanced Development (AD) Contract Award	APR 78	APR 78		
DA Program Review	DEC 81	Not Shown		
Maturation Testing	MAR 83	JUN 82		
ASARC/DSARC III	JAN 83	MAR 85		
Production Award	MAR 83	Not Shown		

Change in milestone dates (SINCGARS-V only) is directly attributable to a recent Army decision to streamline the direction of SINCGARS to expedite fielding of a new combat net radio.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	25088	13682	17862	0	97484
Funds (as shown in FY 1982 submission)	25539	15225	9135	1000	76695
Quantities (current requirements) Quantities (as shown in PY 1982	0	0	450	37455	37905
submission)	0	0	0	0	0

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Program Element: #6.37.46.A

DOD Mission Ares: #345 - Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCGARS)
Budget Activity: 4 - Tactical Programs

- (U) Increases in total estimated costs are attributable to the following:
- a. (U) Cost growth on the three competitive contracts which curtailed the program in FY81 and delayed IOC by 14 months.
 - b. (U) Incorporation of a modification to the Integrated Logistics Support (ILS) Package to all three contractors.
 - c. (U) Reduction in FY 1982 is a result of Joint Congressional action.
 - d. (U) Increase in FY 1983 will reinstate items deferred in FY 1981 due to funding restraints.
- E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands)

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army Funds (current requirements)	0	0	19800	413700	433500
Funds (as shown in FY 1982 submission)	0	0	0	0	0

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Program Element: #6.37.46.A

DOD Mission Area: #345 ~ Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCGARS)
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this task is to develop a new family of combat net radios (manpack, vehicular and aircraft configurations) and selected ancillary devices. The radio has the following key development goals: (1) modularity and maximum commonality of components in the various configurations; (2) capable of operating with an add-on Communications Security (COMSEC) and Electronic Counter-Countermeasure (ECCM) modules; (3) interoperable with combat net radios of our NATO allies; and (4) capable of operating in a nuclear environment (Defense Nuclear Agency participation). There is extensive participation in the program by the Air Force, Mavy, and Marine Corps. SINCGARS-V is being designed either to replace Air Force, Navy, and Marine Corps close air support VHF radios or to be interoperable with them. The system will be capable of operating with or without COMSEC, with or without ECCM, or as a total system in all modes. It will transmit voice, tactical data and record traffic to include teletype and facsimile. To insure a total systems approach on critical ancillary devices, the following are under this element:
- (1) (U) Vehicular Intercom System: This is the intercom system of the future to replace the antiquated AM/VIC-1. Techniques and objectives being explored arc (s) improved operational functions and capabilities, (b) improved reliability and durability, (c) improved installation and maintenance, and (d) improved COMSEC.
- (2) (U) Tranducers: New tranducers are being developed that will increase intelligibility at reduced volumes to overcome hearing losses. The two basic approaches are to: (a) reduce background noise by filtering and directivity, and (b) to extend the audio bandwidth.
- G. (U) RELATED ACTIVITIES: Program Element 6.47.51.A, SINCGARS Engineering Development; Program Element 6.27.01.A, Communications Electronics; Program Element 6.37.07.A, Communications Development; and Program Element 6.47.01.A, Communications Engineering Development, provide exploratory, advanced, and engineering developments of related and supporting single-channel net radio equipment.
- H. (U) WORK PERFORMED BY: Contractors are: Cincinnati Electronics Corp, Cincinnati, OH; ITT Aeronautical/Optical Division, Ft Wayne, IN.

 In-house developing organization is the US Army Communications Research and Development Command (CORADCOM). The National Security Agency (NSA) is responsible for development of the COMSEC Module (VANDAL).

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Program Element: #6.37.46.A

DOD Mission Area: #345 - Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCGARS)
Budget Activity: #4 - Tactical Programs

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: During FY 1981 a severe funding shortfall due to cost growth necessitated a funding limitation on the three contracts and subsequent restructuring to reduce scope and live within available program resources. Effective 1 ceptember 1981, each contract was restructured to: (1) Complete development of manpack/vehicular configurations including llectronic Counter-Countermeasures (ECCM); (2) defer all effort on aircraft subsystem, COMSEC Unit, Securable Remote Control Unit and Data Adapter; (3) terminate all effort on auxiliary receiver; (4) initiate development of the expanded logistic package. Each contract now has a not-to-exceed ceiling price subject to downward negotiation only. Actions to definitize are expected to be completed during early FY82. The Advanced Development (AD) contract for the SMAP 11 was awarded in September 1981. Work was initiated on the procurement data package and specifications for the vehicular intercom system and audio transducers AD program. Completion of brassboard model phase on SINCGARS-V with engineering design tests conducted at all three contractors' plants, Work was initiated on Advanced Development Model (ADM) fabrication and assembly.
- 2. (U) FY 1982 Program: The Army streamlined the direction of the SINCGARS program to expedite the fielding of the radio. The decision was based upon the urgent need for a new tactical radio with Electronic Counter-Countermeasures (ECCM) capability. The new program will field a radio system (a division set) in July 1985 vice July 1986. Two contractors, both developing the slow hopping technique, will each provide advance development models with their ECCM modules in August 1982 for limited laboratory and operational testing prior to production award. The fast frequency contract has been terminated. The requirement for that technology is no longer required. Items deferred (airborne subsystem COMSEC unit, securable remote control and data adapter) due to funding limitations will be resumed.
- 3. (U) FY 1983 Planned Program: Punds requested are required for SINCGARS-V maturation testing and the development of deferred items. Prepare for the ASARC/DSARC. Develop Technical Data Package for the next phase of the program. DT/OT I started on the Vehicular Intercom and Audio Transducers. Engineering support provided on the SNAP II.
- 4. (U) FY 1984 Planned Program: Continue funding of manpack/vehicular configuration together with those associated subsystems previously deferred. The current program is structured to achieve a production decision on the manpack/vehicular configuration with ECCM. Items deferred in FY 1981 due to restructuring the contracts will enter an engineering development phase to allow production. DT/OT I completed on the Vehicular Intercom and Audio Transducer Programs. Engineering support and Incremental funding of contracts continued. Technical Data Packages for Engineering Development (ED) finalized. Solicitations released. Proposal evaluation initiated. DT/OT I initiated on the SNAP II. Engineering support provided.

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Program Element: #6.37.46.A

DOD Mission Area: #345 - Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCGARS)
Budget Activity: 54 - Tactical Programs

5. (U) Program to Completion: Program Initial Operational Capability (IOC) scheduled for July 1985. Proposal evaluations completed. ED contracts awarded on the SNAP II, Vehicular System and Audio Transducer Programs. This project is continued in Program Element 6.47.51.A, Project Number D282.

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Program Element: 6.37.46.A

Title: Single Channel Ground and Airborne Radio Subsystem (SINCGARS)

DOD Mission Area: # 341 - Tactical Communications

Budget Activity: #4 - Tactical Program

- J. (U) Test and Evaluation Data:
 - 1. (U) Development Test and Evaluation.
- a. (U) Development testing of SINCGARS-V will consist of Engineer Design Testing (EDT) and Advanced Development Verification Tests (ADVT) designed to determine and validate the degree to which the contractors meet the technical criteria of the user. In addition, Advanced Development equipment will be tested to evaluate technical performance compared to requirements of the specification.
- b. (U) There are two prototype development contractors: Cincinnati Electronics, Cincinnati, Chio, and ITT Aerospace/Optical Division, Ft. Wayne, Indiana. The US Army Test and Evaluation Command (TECOM) is the proponent agency responsible for the conduct of development tests. For test and evaluation support TECON has contracted with Bell Technical Operational Corporation, Sierra Vista, Arizona. US Army Materiel Systems Analysis Activity is the independent DT designer and evaluator. SINCGARS-V is a major Army program managed by a fully chartered Project Manager Office.
- c. (U) The test facilities to be utilized in the conduct of DT are the Center for Communication Laboratory facilities, Ft. Monmouth, NJ and Army Electronic Proving Ground (AEPG), Ft. Huachuca, AZ. Army civilian and military personnel will be used to conduct these tests. Contractor test facilities and personnel will be used to conduct the contractor portion of the DT. AEPG personnel will monitor these tests.
 - d. (U) The schedule for testing is:
 - (1) (U) EDT (Draft Plan) January 1980
 - (2) (U) EDT July 80-January 82
 - (3) (U) Final Design Review March 1982
 - (4) (U) ADVT (Draft Plan) March 1982
 - (5) (U) ADVT (Contractor) June 1982-February 1983 (6) (U) Test Evaluation Master Plan (TEMP), March 1982
- e. (U) Each contractor will provide 4 receiver-transmitters in the following configurations for limited development testing:
 - (1) (U) Two (2) Manpack

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Program Element: 6.37.46.A

Title: Single Channel Ground and Airborne Radio

Subsystem (SINCGARS)

Budget Activity: #4 - Tactical Program

DOD Mission Ares: # 345 - Tactical Communications

(2) (U) Two (2) Vehicular (Short-range)

(3) (U) Two (2) Vehicular (Long-Range)
(4) (U) Two (2) Vehicular Long-Range with additional Short-Range capability

(5) (U) In addition, four (4) Electronic Counter-Countermeasure (ECCM) Modules will be delivered for test during DT. Ancillary devices such as the BCCM fill device will also be available for test.

- f. (U) In addition to the Army, SINCGARS-V will be utilized by the Nevy, Marines, and Air Force.
- g. (U) EDT was successfully completed in 2 Qtr FY 1982.
- h. (U) Some reliability Growth Testing will be performed during DT. Data from this test will identify items requiring frequent maintenance. Sufficient test time will be available to verify the adequacy of design changes incorporated to reduce the frequency of repair. Subsequent to DT/OT, each contractor may be required to conduct a Prototype Reliability Qualification Test (PRQT), a Maintenance Teardown and Evaluation, and a Maintainability Demonstration. The PRQT will verify those design changes which were not verified during the Reliability Growth Test and verify the adequacy of design changes resulting from DT/OT.
- (U) The Maintenance Teardown and Evaluation and the Maintainability Demonstration will be conducted to evaluate technical manuals and maintenance capability (e.g., BITE, test support equipment, maintenance concept, etc.). Maintenance personnel used during these tests will be military personnel with appropriate Military Occupational Specialty (MOS).
- 1. (U) The items to be tested during DT and OT will be similar in configuration. Improvements recommended as a result of DT/OT will be incorporated in the production models.
 - j. (U) Environmental testing will be conducted in accordance with MIL-STD-810C.
 - 2. (U) Operational Test and Evaluation:
- a. (U) Maturity Teating (field) of SINCGARS-V will be conducted between April 1983 and August 1983. Testing will concentrate on obtaining data for subsequent evaluation of the functional performance of each SINCGARS-V configuration and the overall effectiveness of SINCGARS-V concepts. Typical users (soldiers) will operate the equipment.
 - b. (U) Operational Testing will be completed.

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Program Element: 6.37.46.A

Single Channel Ground and Airborne Radio

Subsystem (SINCGARS)

DOD Mission Area: # 345 - Tactical Communications

Budget Activity: #4 - Tactical Program

- c. (U) All subsystems and support equipment are forecasted to be available for testing as scheduled.
- d. (U) There will be one prototype development contractor. Operational Test and Evaluation Agency (OTEA) is the Army proponent agency responsible for the conduct of Operational Tests.
- e. (U) OTEA and US Army Forces Command (FORSCOM) will select the OT test site. OT will be conducted by an active Army unit. OT is designed to test the SINCGARS-V configuration and will be tested against the requirements stated in the Joint Required Operational Capability.
 - f. (U) The schedule for operational testing is:
 - (1) (U) OT (Maturity Test October 1982
 - (field)) (2) (U) OT

April 1983-August 1983

(3) (U) TEMP

March 1982

- g. (U) The contractor will provide the following for OT:
- (1) (U) Four (4) Manpack
- (2) (U) Six (6) Vehicular (Short-Range)
- (3) (U) Twelve (12) Vehicular (Long-Range)
- (4) (U) Four (4) Vehicular Long-Range with additional Short-Range capability
- (5) (U) Twenty-three (23) ECCM modules will be available for test during OT. Ancillary devices will also be available and tested as part of the system.
- h. (U) SINCGARS-V will be utilized by the Navy, Marines, and Air Force in addition to the Army. No tests have been conducted by any of these DOD components.
- 1. (U) Subsequent to DT/OT the contractor may be required to conduct a Prototype Reliability Qualification Test (PRQT), a Maintenance Teardown and Evaluation, and a Maintainability Demonstration.
- (U) The RAM requirements will be the same as the development test requirements.

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Program Element: 6.37.46.A

Title: Single Channel Ground and Airborne Radio
Subsystem (SINCGARS)
Budget Activity: 44 - Tactical Program

DOD Mission Ares: # 345 - Tactical Communications

j. (U) Limited OT is scheduled to be completed prior to production contract award.

3. (U) System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated
FREQUENCY RANGE NUMBER OF CHANNELS CHANNEL SPACING	30–88 MHz 2320 25 kHz	DT/OT will be completed in FY83.
VOICE COMMUNICATIONS RANGE		•
Hanpack Vehicular Aircraft	8 km 35 km 35 km	
DIGITAL TRANSMISSION (DATA) (Bit Error Bat	e .1B/S)	

TACFIRE DATA (1200) ALL OTHER DATA SAME AS VOICE ABOVE 4.5 km 17.5 km MANPACK VEHICULAR

PHYSICAL DETECTABILITY

MANPACK 200 m VEHICULAR 500 m

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Program Element: 6.37.46.A

Title: Single Channel Ground and Airborne Radio Subsystem (SINCGARS)

Budget Activity: #4 - Tactical Program

DOD Mission Area: # 345 - Tactical Communications

3. (U) System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated
ANTI-JAM	(Classified) db	
(MEAN TIME TO REPAIR) (HTTR)		
ORGANIZATIONAL	15 min	
DIRECT SUPPORT	45 min	
GENERAL SUPPORT	2.5 hrs	
(MEAN TIME BETWEEN FAILURE) (MTBF)		
MANPACK	1300 hrs	
VEHICULAR	1250 hrs	
AIRBORNE	750 hrs	

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PY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.47.A

DOD Mission Area: #215 - Land Warfsre Support

Title: Soldier Support/Survivability
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROCRAM ELEMENT	FY 1981 Actual 3842	FY 1982 Estimate 3134	FY 1983 Estimate 2251	FY 1984 Estimate 5855	Additional to Completion Continuing	Total Estimated Cost Not Applicable
D610	Food Advacced Development	1274	1375	1194	1625	Continuing	Not Applicable
D669	Clothing and Equipment	2568	1759	1057	4230	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program is designed to meet the needs of the individual soldier for modernization of clothing, individual equipment, and field service support equipment. It also provides the Army, as Executive Agent of the Department of Defense, the resources to conduct advanced development of foods, food service equipment, and food service systems for identified requirements of all the military services and the Defense Logistics Agency.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Items to be developed under this program are essential for improving the combat effectiveness of the soldier, assuring compatibility of soldier's clothing and equipment with new weapons systems, and increasing his survivability and effectiveness on the battlefield. Prototype items and concepts will be developed and tested to generate preliminary data relative to producibility, cost, and capability of prototypes to meet a defined operational need. The program allows for generation of projected life cycle cost and evaluation by developer and user prior to the decision to enter full-scale development. The food research requirements provide for Advanced Development of new foods and equipment for the Army, Navy, Air Force, Marine Corps, and Defense Logistics Agency, and constitute a part of the Department of Defense (DOD) Food Research, Development, Testing, and Engineering (RDT&Eng) Program managed by the Army.

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Program Element: #6.37.47.A

DOD Mission Area: #215 - Land Warfare Support

Title: Soldier Support/Survivability
Budget Activity: 44 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

RDTE	PY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
Funds (current requirements)	3842	3134	2251	Continuing	Not Applicable
Funds (as shown in FY 1982	3252	3140	3307	Continuing	Not Applicable
submission)					

Increase of \$590 thousand in the FY 1981 funding level is a result of reprograming to accelerate development of the microclimate cooling system for armored vehicle crewmen. The funding decrease of \$5 thousand in FY 1982 is a result of the amended budget request and the application of revised inflation indices. The decrease of \$1,056 thousand in the FY 1983 estimate is the result of decreasing the scope of the program to meet revised program priorities.

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

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Program Element: #6.37.47.A

DOD Mission Ares: #215 - Land Warfare Support

Title: Soldier Support/Survivability
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program element contains two military personnel-oriented projects for development of food, clothing, and related personal and protective equipment for the individual. This includes efforts to respond to DOD and other Services' requirements relative to their specific operational needs for food and food service equipment, as well as to address jointly those needs which are common to two or more Services. Allocation of funds to the various food program efforts is based on priorities assigned by the Joint Formulation Board comprised of representatives from all military Services and the Defense Logistics Agency. New items of clothing, individual equipment, and field service support equipment will improve the effectiveness and survivability of the individual soldier through: better cold and hot weather protective clothing; individual equipment for noise attenuation; and protection against nuclear flash, chemical and biological agents; increased protection from visual and electronic detection; and improved personal hygiene. New food systems and components will ensure a responsive food system anywhere in the worldwide military mission areas, many of which are outside the sphere of the Continental United States (CONUS) commercial food distribution system. Overall emphasis in food development is to reduce the number of combat food service personnel, minimize food procurement cost, and reduce overall food logistic support requirements.
- G. (U) RELATED ACTIVITIES: Each of the military Services performs work to develop its Service-peculiar items of clothing and individual equipment. To prevent duplication of effort, close coordination is maintained through joint working groups, Joint Service agreements and circulation of requirement documents. Many of the items developed under this program are now used by other Services. Work in clothing and individual equipment is also performed in Program Element (PE) 6.27.23.A, Clothing, Equipment, and Shelter Technology, Project AH98, Clothing and Equipment Technology; and in PE 6.47.13.A, Combat Feeding, Clothing and Equipment, Project DL40, Clothing and Equipment. Food research is a fully coordinated Joint Services effort and related work is conducted in PE 6.27.24.A, Food Technology; and PE 6.47.13.A, Combat Feeding, Clothing and Equipment, Project D548, Military Subsistence Systems. Basic research in support of both the food and clothing programs is done in PE 6.11.02.A, Defense Research Sciences, Project AH52, Research in Support Equipment of Individual Soldier.
- H. (U) WORK PERFORMED BY: In-house work in this program is performed by the US Army Natick Research and Development Laboratories, Natick, MA; US Army Human Engineering Laboratory, Aberdeen Proving Ground, MD; US Army Research Institute of Environmental Medicine, Natick, MA; US Army Arromedical Research Laboratory, Fort Rucker, AL; US Army Electronics Research and Development Command, Fort Momental, NJ; and US Department of Agriculture Stored Products and Insects Research and Development Laboratory, Savannah, GA. Examples of contractors are Gentex Corporation, Carbondale, PA; Dynamic Science Corp, Phoenix, AZ; Dynatherm Corp, Cockeysville, MD; and Air Cruisers Co, Relmar, NJ.

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Program Element: #6.37.47.A DOD Mission Area: #215 - Land Warfare Support Title: Soldier Support/Survivability
Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Preliminary design and evaluation of a new low-pressure as beam concept was completed for a high Mobility Helicopter Maintenance Shelter and a prototype constructed and evaluated. Potential application to maintenance shelters for tanks, trucks, and other vehicles was also demonstrated. The new helmet currently in procurement was developed in this program as well as greatly improved body armor for ground troops. A lightweight and highly compact assault ration has been field-tested by the Marine Corps with very good troop acceptance. Effects of rising meat procurement costs on the military ration allowance have been retarded by the development of highly acceptable beef, lamb and pork products under this program. An early prototype mobile food service unit has been developed which can heat and serve high-quality hot meals with minimum number of trained food service personnel. This unit will be refined and employed in the New Combat Food Service System for ground forces.
- 2. (U) FY 1982 Program: Complete advanced development (AD) of the Combat Vehicle Crewman's Helmet and transition to engineering development. Continue AD of microclimate cooling for armored vehicle crewmen by developing and testing prototype models. Continue work effort on microw clothing system for cold weather. Complete AD of the Transportable Helicopter Enclosure, conduct in-process review, and transition to Engineering Development. Initiate AD of lightweight chemical and biological protective gloves to provide the required degree of tactility for crewmen operating in a toxic environment. Continue AD of field food service equipment to replace obsolescent Army, Air Force, and Marine Corps equipment with particular emphasis on food service systems which complement and support the highly mobile weapon systems being introduced into the combat forces. Continue evaluation of the Navy's hydroponic unit. Initiate AD on Army Air Force and Marine field feeding systems equipment. Continue AD of Marine Corps assault food packet. Development of military submistence items for which there are no commercial equivalents for use by the Joint Services.
- 3. (U) PY 1983 Planned Program: Continue advanced development (AD) of the microclimate cooling system and transition work effort on microclimate cooling for armored vehicle crewmen to engineering development. Complete AD of cold weather sircrew clothing system to achieve a 30% weight reduction and transition to engineering development. Continue work on lightweight, high-tactility chemical/biological protective gloves. Continue AD of military-unique food items for which there are no commercially available equivalents. Complete AD on the Marine assault pack. Continue AD of equipment in support of the USAF forward base food service system. Continue AD of Army field feeding equipment. Provide support for Army field hospital food service system. Continue evaluation of the Navy hydroponics unit.

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Program Element: #6.37.47.A

DOD Mission Area: #215 - Land Warfare Support

Title: Soldier Support/Survivability
Budget Activity: 44 - Tactical Programs

- 4. (U) FY 1984 Planned Program: Complete advanced development (AD) of lightweight CB-protective gloves and transition to engineering development. Initiate AD of multipurpose overboot to provide combined environmental and chemical protection. Initiate work on a laundry/bath chemical agent decontamination system. Initiate AD of: heated handwar to provide aircrewmen with required highly tactile gloves for temperatures below O°F; integrated combat vehicle crewmen clothing system to provide protection from battlefield threats; microclimate cooling system for aircrew members operating in hot climates and in chemically toxic environments; integrated chemical and biological protective clothing system; multifunctional eye protection; microclimate cooling for the dismounted soldier and clothing to protect petroleum, oil, and lubricant handlers in extreme cold weather. Continue AD of military food items for which there are no commercial equivalents. Continue AD of Army Combat Food Service System and field hospital food service systems. Continue AD on the Navy hydroponics unit.
 - 5. (U) Program to Completion: This is a continuous program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.50.A

DOD Mission Area: #276 - Defensive Chemical and Biological Systems

Title: Drug and Vaccine Development
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	4786	5073	8796	12957	Continuing	Not Applicable
D808	Drug and Vaccine Development	4786	5073	8796	12957	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEEDS: This program element provides advanced drug and vaccine development to meet the needs of the Department of Defense (DOD) to protect combat forces against naturally occurring endemic diseases and biological warfare (BW) agents. The prevention and treatment of diseases which affect military operations \ depend upon the DOD capability to develop vaccine and drugs.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: The logical progression in development of effective drugs and vaccines for preventing and treating militarily important infectious diseases requires preclinical and clinical evaluation through multiple stages in human subjects in compliance with Federal regulations. This program fulfills these requirements; it is essential for development of drugs and vaccines that are required to protect our combat forces.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	PY 1981	FY 1982	<u>FY 1983</u>	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	4786	5073*	8796**	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	4786	5087	7781	Continuing	Not Applicable

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Program Element: #6.37.50.A

DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

Title: Drug and Vaccine Development
Budget Activity: 14 - Tactical Programs

- * The funding decrease of \$14,000 in FY 1982 is a result of the budget repricing.
- ** The difference in funding levels for PY 1983 is due to the consolidation of the Army and Navy infectious disease research programs as directed by Congress in the PY 1982 Appropriations Bill.
- E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

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Program Element: #6.37.50.A

Did Mission Area: #276 - Defensive Chemical and
Biological Systems

Title: Drug and Vaccine Development
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The DOD has a continuing requirement for safe and effective drugs and vaccines to protect people against endemic and epidemic diseases which may impair combat operations in any geographical region. To assure atrategic mobility, drugs and vaccines must be available to protect against diseases if contingency plans are activated. This program provides the source for pilot manufacturing and safety and efficacy testing of militarily critical drugs and vaccines to meet DOD specific needs. The primary thrust is testing and evaluation of vaccines, antitoxins, and drugs effective against viral, rickettsial, bacterial, and protozoal diseases including those caused by potential BW agents.
- G. (U) RELATED ACTIVITIES: This program element is supported by basic research in Program Element 6.11.02.A, Defense Research Sciences (specifically Project BS10, Military Disease, Injury, and Health Hazards), and Program Element 6.27.70.A, Military Disease Hazards lechnology (which consists of two projects: A870, Risk Assessment of Military Pisease Hazards, and A871, Prevention of Hilitary Disease Hazards). Coordination of projects among the program elements is a hieved by the Commander and staff of the US Army Medical Research and Development Command (USAMRDC). Army representation on DOD coordinating committees and other government agency councils insures that the Army's medical research program complements the work of other Federal medical institutions. Overall review and control of DOD's medical research was brought under centralized management in FY 1961 by the formation of the Armed Services Biomedical Research Evaluation and Management (ASBREM) Committee. Joint Technology Coordinating Groups (JTCG) were established in various disciplines to insure effective management at the investigative level. Two JTCG review research within the Army's Military Disease Bazards Research Program. They are the JTCG for Infectious Diseases of Military Relevance (JTCG/IDMR) and the JTCG for Medical Biological Warfare Defense (JTCG/MBWD). The mission of these JTCG has been established; it is to: (1) assess and prioritize disease threats. recommend research requirements to counter identified threats, and analyze the resources available to meet these research requirements; (2) recommend interservice distribution of responsibility for program execution, changes in program direction or emphasis, new initiatives, and other matters dealing with program requirements and relevance; and (3) review and coordinate disease research and development programs (keyed to the planning, programing and budgeting cycle of each service). In addition, information exchange occurs freely at the working and administrative levels with other governmental agencies, especially the National Institutes of Health, to avoid duplication of research effort.
- H. (U) WORK PERFORMED BY: Approximately 44 percent of the research is conducted at Walter Reed Army Institute of Research and its field unit in Thailand and the US Army Medical Research Institute of Infectious Diseases, Fort Detrick, Frederick, MD. Approximately 56 percent of the work is accomplished through contracts with industries and universities. The top five contracts are with the Salk Institute, Swiftwater, PA; Herner and Co., Arlington, VA; Bio Med, Inc., College Park, MD;

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Program Element: #6.37.50.A

DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

Title: Drug and Vaccine Development
Budget Activity: #4 - Tactical Programs

Warner Lambert, Inc., Ann Arbor, HI; and the University of Hawaii, Honolulu, HI. Elements of Naval Medical R&D Command participate in drug and vaccine development under Army program management.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1961 and Prior Accomplishments: A tetravalent vaccine for meningitis developed at Walter Reed Army Institute of Research was tested successfully for safety and immunogenicity in recruits. Evidence accumulated that fansidar, a prime antimalarial drug, is becoming ineffective in treating melaria in Southeast Asia because of developing resistance by the malaria parasite. Army scientists are continuing with clinical safety and tolerance trials of other antimalarial drugs; mefloquine is the most promising candidate. Testing of a new experimental vaccine for Rift Valley fever was initiated in human volunteers.
- 2. (U) FY 1982 Program: The field trials of the antimalarial drug, mefloquine, will be completed. Two new antimalarial drugs will enter phase I testing in FY 1982. Clinical testing of a vaccine against dengue serotypes 1, 3, and 4 will begin. Testing of the Gonococcus vaccine in volunteers will begin. Phase III testing of R. coli vaccines will be initiated. Advanced clinical trials of the antimalarial drug, Halofantrine, will commence. A new antimalarial drug, WR 1800409, will be tested for safety and efficacy in patients with malaria. Antiviral drugs against BW agents will enter phase I testing.
- 3. (U) FY 1983 Planned Program: Ongoing studies with existing drugs will continue and one to three new drugs should enter phase I testing each year. Work on dengue fever will proceed in an effort to produce one vaccine effective against all four types. Studies will continue on the gonococcal and E. coli vaccines. Development of malaria, pseudonomas, and epidemic/endemic typhus vaccines will proceed in Navy laboratories under Army program management. Evaluation will continue on treatment drugs for acute diarrheal diseases.
- 4. (U) FY 1984 Planned Program: Work on Rift Valley fever will proceed in an effort to produce a new vaccine. Field trials for a vaccine against chikungunya virus (a potential BW agent) will take place. The testing of promising new anti-parasitic drugs will continue as they become available. Development of a malaria vaccine and evaluation of pseudomonas and rickettsial vaccines will continue. Treatment drugs for typhoid fever and other intestinal/diarrheal diseases will be evaluated. Improved methods for the rapid diagnosis of viral hemorrhagic fever and gastrointestinal infections will continue to be developed.

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rogram Element: #6.37.50.A

DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

Title: Drug and Vaccine Development
Budget Activity: #4 - Tactical Programs

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

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.51.A

DOD Mission Ares: #276 - Defensive Chemical and

#276 - Defensive Chemical and Biological Systems

Title: Medical Defense Against Chemical Warfare
Budget Activity: 44 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 0	FY 1982 Estimate 2933	FY 1983 Estimate 2924	Additional to Completion Continuing	Total Estimated Cost Not Applicable
D993	Medical Defense Against Chemical Warfare	0	2933	2924	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This new start in advanced development is critical to the Department of Defense schieving a modern and viable capability to provide medical defense against chemical warfare agents. The US Army Medical Research and Development Command has been delegated the responsibility to meet joint service requirements in development of medical life support materiel to counter the threat on a chemically contaminated battlefield. To accomplish this mission, an Integrated Medical System for Individual Protection will be developed and ultimately fielded. This system will provide maximum soldier survivability on the integrated battlefield by providing chemical warfare agent antidotes, patient decontamination capability, and the ability to effectively manage chemical warfare casualties. Such a system is vital to preserve the tactical advantage on the modern battlefield.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: The major thrust will be to establish extramural programs to assess the subchronic toxicology of new antidotes and decontamination compounds needed for survival on the chemical battlefield. Individual and multipatient resuscitators/ventilators critical to soldier survivability on the chemical battlefield will be evaluated. In addition, advanced development work will be continued on new antidote delivery systems, patient vital signs monitor, chemical hardening of medical supplies, and a new chemical-protective patient wrap.

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Program Element: #6.37.51.A

DOD Mission Area: #276 - Defensive Chemical and Biological Systems

Title: Medical Defense Against Chemical Warfare
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Junds (current requirements) Funds (as shown in FY 1982	0	2933	2924	Continuing	Not Applicable
submission)	0	2941	3000	Continuing	Not Applicable

The funding decrease of \$8 thousand in FY 1982 is a result of the amended budget request and the application of revised inflation and civilian pay pricing indices and the OSD Program Budget Decision. The funding decrease of \$76 thousand in FY 1983 is a result of adjustments made following the amended budget request.

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

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Program Element: 66.37.51.A

DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

Title: Medical Defense Against Chemical Warfare
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The US Army Medical Research and Development Command was assigned the mission for medical chemical defense in 1979. An integrated and phased RDTE program has been established to address those medical problems anticipated on a chemically contaminated battlefield. As part of this phased effort, an advanced development effort was programed to begin in FY 1982. This new advanced development effort is essential for developmental transition of medical chemical life support materiel to enable fielding of an Integrated Medical System for Individual Protection. This system will include chemical warfare agent antidotes, prophylaxes, pretreatment compounds, therapeutics, antiradiation drugs, and new life support materiel for soldier self-help/first aid, for maintenance of life support during evacuation, and for treatment of chemical casualties. Advanced development funding is required for Phase II chemical testing of drugs. This will include advanced toxicity, tolerance, and safety testing and advanced pharmacokinetic studies of the drugs. Such attoics are required to support the submission of a New Drug Application (NDA) to the Food and Drug Administration (FDA) for approval for use in humans.
- G. (U) RELATED ACTIVITIES: This Program Element/Project is supported by Program Element 6.11.02.A, Defense Research Sciences, Project BS10, Military Disease, Injury, and Health Kazards; Program Element 6.27.34.A, Medical Defense Against Chemical Agents, Project A875, Medical Defense Against Chemical Agents; and by Program Element 6.37.64, Medical Chemical Defense Life Support Materiel, Project D995, Medical Chemical Defense Life Support Materiel. The US Army Medical Research and Development Command avoids duplication of effort within the Army by central management of the program on the Medical Aspects of Chemical Defense. Interservice duplication is avoided by coordination and collaboration with the Air Force and Navy as required of the Army as the Executive Agency for the D0D chemical defense effort. Such coordination is accomplished within the framework of a Memorandum of Agreement with the Air Force and through the Joint Technology Coordination Group for Medical Chemical Warfare Defense of the Armed Services Biomedical Research Evaluation and Management Committee. All work is also coordinated with quadripartite and NATO nations through meetings and data exchange annexes.
- H. (U) WORK PERFORMED BY: This is a new start in FY 1982, and consequently no contractors are funded by this Program Element/Project as yet. In-house research will be supported at the Walter Reed Army Institute of Research, Washington, DC; US Army Medical Research Institute of Chemical Defense (formerly the US Army Biomedical Laboratory), Aberdeen Proving Ground, MD; and the US Army Medical Bioengineering Research and Development Laboratory, Fort Detrick, MD.

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Program Element: #6.37.51.A

DOD Mission Area: #276 - Defensive Chemical and Biological Systems

Title: Medical Defense Against Chemical Warfare
Budget Activity: #4 - Tactical Programs

- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 1981 and Prior Accomplishments: Not applicable.
- 2. (U) FY 1982 Program: This new start advanced development program will focus on efforts to provide an effective medical system for maximizing safety and survivability of the soldier on the chemically contaminated battlefield. The major thrust will be on field-resuscitative materiel. Currently the US is without resuscitator/ventilator capability for more than one patient. Large numbers of casualties must be anticipated. The development of multipatient resuscitator capability is critical because respiratory arrest is a primary cause of death from chemical agent poisoning. Additional efforts will be initiated on a first-generation patient decontamination system, and other items of materiel (e.g., patient wrap, decontaminable litters, chemically hardened medical supplies, and antidote delivery systems).
- 3. (U) FY 1983 Planned Program: Major emphasis will be on subchronic toxicology of new agent antidotes and decontaminable compounds, advanced development of patient decontamination system and evaluation of first-generation multipatient resuscitators/ventilators. Efforts will continue on development of antidote delivery systems, patient vital signs monitors, physical protection of medical supplies, and evaluation of new chemical-protective patient wrsp.
- 4. (U) FY 1984 Planned Program: Drug development efforts will continue as well as advanced development of patient decontamination systems, assessment of multiple chemical warfare casualty resuscitator/ventilator for aid station and field hospital use, and vital signs monitors.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

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Program Element: # 6.37.53.A

DOD Mission Area: # 217 - Land Warfare Surveillance

Title: Battlefield Data System
Budget Activity: #4 - Tactical Programs

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

and Reconnaissance

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	1891	5429	TBD	TBD
D201	Battlefield Data System	0	0	1891	5429	TBD	TBD

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The US Army lacks the capability to locate moving targets beyond ground line of sight because the speed of modern combat makes it critically important that the division and corps commanders have a responsive, near-realtime capability to detect, locate, and monitor moving formations out to the enemy's second-echelon units in order to concentrate friendly combat power at critical times and places, and employ their firepower at . Within the Battlefield Data System (BDS) program elements, the Army will develop an airborne surveillance and target acquisition system that will Within the Battlefield provide this critically needed capability. The system will locate moving targets at extended ranges during the day or night, under most weather conditions. It will be designed to perform successfully in the severe electronic countermeasures and air defense environments forecast for It 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 video data at ground Command Interface Modules (CIM) will permit the efficient and timely use of this information. During the Advanced Development phase, a prior program (Standoff Target Acquisition System (SOTAS)) successfully used off-the-shelf hardware to extensively field-test the concept and ensure that the requirements were well defined. Continued tagtical experience gained from the advanced development systems deployed to 7th Army Europe--designated the Interim-Interim SOTAS systems--has further verified the tactical payoff of a SOTAS-like system to the operational commander.

Program Element: # 6.37.53.A

DOD Mission Area: # 217 - Land Warfare Surveillance and Reconnaissance

Title: Battlefield Data System

Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1983 RDTE REQUEST: The FY83 program will be based on system studies completed in FY82 to develop lower cost alternatives to the recently terminated Standoff Target Acquisiton System (SOTAS). Depending upon the outcome of these studies, the Army may either develop a new sensor or develop modifications to existing sensors to enable these to fulfill the requirement. Proposals will be received and evaluated.

Current Major Milestones Milestone Dates		Milestone Dates Shown in FY 1982 Submission
Initiate New Program Element	1QFY83	N/A
Release RPP	2QFY83	N/A
Contract Award for MSTAR	1QFY84	N/A

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
RDTE						
Funds (current requirements)	0	0	1891	5429	TBD	TBD
Funds (as shown in FY 1982 submission)	0	0	0	0	0	0

This is a new start in FY 1983. On 3 November 1981 a the FY 1982 Joint Authorization Conference agreed that although the SOTAS program should be terminated, a "SOTAS like" system is needed by the Army.

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

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Program Element: # 6.37.53.A

DOD Mission Area: # 217 - Land Warfare Surveillance and Reconnaissance

Title: Battlefield Data System
Budget Activity: #4 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: The system to be defined and developed within the Battlefield Data System program elements (6.47.53 and 6.37.53) will conceptually consist of an airborne moving target indicator (MTI) sensor, a position location system, a data link, and a command interface module for data processing and display. Because of its near-realtime detection and location capability, the system will provide the data necessary for the effective engagement of targets located beyond the ground line-of-sight by both Army and Air Force weapons systems as well as permit the Division Commander to mass his ground maneuver elements at critical times and places.
- G. (U) RELATED ACTIVITIES: The advanced development sensor subsystem effort performed in this program element will be incorporated into the engineering development program element 6.47.53. A General Officer Steering Group and an OSD-level task force are working with DARPA, the Air Force, and the Navy to ensure that all viable approaches, including Army (OV-ID ESCAN) and other service candidates (Pave Mover, etc.), and that there is no unnecessary duplication of effort either within the Army or the Department of Defense. The system design will incorporate in production a data link currently being developed under the Modular Integrated Communication and Navigation Systems (MICNS) program in PE 6.47.05.A. The use of this common data link will significantly enhance logistic supportability in the field. Current plans are to use a substitute data link developed by the Cubic Corporation for the Engineering Development (ED) phase. If ED models of the MICNS data link are available, they will be incorporated in the ED system instead of the Cubic data link.
- H. (U) WORK PERFORMED BY: Not applicable. This is a new start, and contractors have not been selected.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Prior accomplishments go back to FY74 and consist of having established the technical feasibility of using airborne Moving Target Indicator (MTI) radar data, transmitted to a ground-based Command Interface Module (CIM). Initial tests at the Hunter-Liggett Military Reservation established that such a system could detect, locate, and engage targets at distances well beyond the FLOT. Following these tests, there was a successful demonstration at White Sands of integrating the concept demonstration system with the Air Force's Advanced Location Strike System (ALSS). In 1976, this same system was first demonstrated in Korea and then allowed to participate in both the REFORGER 76 and 77 exercises. In 1978, two advanced development (AD) models were deployed to Europe and are currently part of the operational capability of the 1st AD and the 3rd ID. A complete Simulation/Trainer for the ground Command Interface Module (CIM) has been developed by Honeywell Systems Research. This simulator/trainer is currently in operation at the Honeywell

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Program Element: # 6.37.53.A

DOD Mission Area: # 217 - Land Warfare Surveillance

and Reconnaissance

Title: Battlefield Data System
Budget Activity: #4 - Tactical Programs

plant in St. Anthony, MN. It is not only capable of simulating the CIM for training purposes, but it can also be used for development testing of new concepts and application of the CIM.

- 2. (U) FY 1982-FY 1984 Program: This is a new start in FY 1983. In FY82, a General Officer Steering Group will direct Army efforts to develop lower cost alternatives to the recently terminated Standoff Target Acquisition System (SOTAS). The Army's effort includes participation in an OSD-level task force to identify candidate systems and t-chnologies from other DOD components. By late FY 1982, the best approach will be selected, and system definition will to initiated. It is anticipated that a modular evolutionary system design will result which will sllow for further improvement over time to fill the target acquisition and surveillance needs of both corps and division commanders. The Engineering Development program (in PE 6.47.53) will be supported by an Advanced Development effort which will develop follow-on improvements to the sensor, data link, platform, positioning system, and ground Command Interface Module. These will be phased into the system as they mature as preplanned product improvements.
 - 3. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.55.A Title: Tactical Electronic Countermeasures Systems

DOD Mission Area: #374 - Electronic Warfare - Multi-Mission Budget Activity: #4 - Tactical Programs

Technology and Support

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	9901	17793			Continuing	Not Applicable
DK12	Communications Electronic						
	Countermeasures Systems	6624	8304	•		Continuing	Not Applicable
DK13	Non-Communications Electronic						
	Countermeasures Systems	2824	3737			Continuing	Not Applicable
DK14	Expendable Jammers	0	5752	•		Continuing	Not Applicable
D251	Protective Electronic						
	Warfare Equipment	453	0	•		Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to provide for validation/advanced development of tactical 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. Divercoming current equipment deficiencies

importance to the Army tactical commander. This program 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 24-hour, all-weather coverage in depth.

Program Element: #6.37.55.A Title: Tactical Electronic Countermeasures Systems

DOD Mission Area: #374 - Electronic Warfare - Multi-Mission Budget Activity: #4 - Tactical Programs

Technology and Support

C. BASIS FOR FY 1983 RDTE REQUEST: FY 1982 funds are required to support development of automatic test equipment applications software for the heliborne jammer (QUICK FIX), continuation of advanced development of a family of expendable jammers with the initiation of advanced development of the unattended platform jammer, development of the Set-on expendable jammer, artillery-delivered expendable jammers, sdvanced development of the Air Defense Electronic Warfare System (ADEWS), and initiation of advanced development of the HOMERUN

D. COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	9901	17793		Continuing	Not Applicable
submission)	8792	17841		Continuing	Not Applicable

Decrease in FY 1983 is caused by reprograming to higher priority Army programs. Increase in FY 1981 due to reprograming to DK12 to conduct QUICK FIX Automatic Test Equipment Software development.

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

	FY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Other Procurement, Army*: Funds (current requirements)	61000	45200		٦		

Program Element: #6.37.55.A Title: Tactical Electronic Counterme sures Systems

DOD Mission Area: #374 - Electronic Warfare - Multi-Mission Budget Activity: #4 - Tactical Programs

Technology and Support

	PY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Estimated Cost
Funds (as shown in FY 1982 submission) Quantities (current requirements)	62700 25	70200 13		Not Shown		
Quantities (as shown in FY 1982 submission)	25	24		Not Shown		

* Funds/quantities shown are for TACJAM (Project DK12). Reduction in FY 1981 and FY 1982 are due to reprograming to higher priority Army programs. FY 1983 funds were eliminated because an analysis of planned production rates and production reorder leadtimes determined that the maximum delivery rate of two systems per month could be maintained without the FY 1983 funds. Funds were added in FY 1984 to continue the program to equip the active force.

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Total Additional Estimated To Completion Cost
Aircraft Procurement, Army**:					
Funds (current requirements)	0	0			
Funds (as shown in FY 1982 submission)	0	4600		Not Shown	
Quantities (current requirements)	0	0	_		
Quantities (as shown in FY 1982 submission)	0	0	-	Not Shown	

**Funds/quantities shown are for QUICK FIX/BLACK HAWK (UH-60A) sircraft (Project DK 12). Changes in funding and quantities are to reflect BLACK HAWK production.

*** Quantity determined subsequent to submission of FY 83 Procurement Annex.

Program Element: #6.37.55.A Title: Tactical Electronic Countermeasures Systems
DOD Mission Area: #374 - Electronic Warfare - Multi-Mission Budget Activity: #4 - Tactical Programs
Technology and Support

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to provide for validation/advanced development of tactical electronic countermeasures (ECM) equipment and systems to deny or to degrade the enemy's use of his electromagnetic communications and radar devices. This program includes the development of ECM equipment to deny and/or degrade hostile forces use of their communications, noncommunications, infrared, and optical battlefield surveillance devices. Equipment developed includes ground-vehicular-mounted and airborne ECM systems. Developments includ. Heliborne Communications Jamming System (QUICK FIX); Tactical Army Communications Jammer (TACJAM); quick-erectable antenn. mast assemblies; automated test equipment software development for all systems; expendable jammers for

warning devices as self-protection measures for tactical vehicles and installations; and countermeasures to

Systems developed in this program element normally proceed to Program Element 6.47.50.A, Tactical Electronic Countermeasures Systems, for full-scale development.

- G. (U) RELATED ACTIVITIES: Related electronic warfare developments are conducted by the Air Force and Navy. Air Force developments are conducted in Program Elements 6.37.18.7, Electronic Warfare Technology, and 6.37.43.F, Electro-Optic Warfare. Navy developments are found in Program Elements 2.57.64.N, Electronic Warfare Countermeasures Response; 6.35.21.N. Surface Electronic Warfare; and 6.37.97.N, Surface Electromagnetic and Optical Systems. Coordination is maintained between the Services to maximize the interchange of technical data and minimize duplication of effort. Coordination is accomplished by the exchange of 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, formal requirements documents of each Service are exchanged and reviewed by the other Services. Coordination is also accomplished as part of the program reviews conducted by the Office of the Secretary of Defense (Under Secretary for Defense for Research and Engineering).
- H. (U) WORK PERFORMED BY: US Army Electronic Warfare Laboratory, Fort Monmouth, NJ; the US Army Signal Warfare Laboratory, Vint Hill Farms Station, Warrenton, VA; US Army Materiel Development and Readiness Command, Alexandria, VA. The major contractors are: ESL Incorporated, Sunnyvale, CA; GTE Sylvania, Mountain View, CA; and RCA Corporation, Camden, NJ.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- FY 1981 and Prior Accomplishments: Studied techniques for guided missile (ATGM). Electronic countermeasures (ECM) for ATGM were field tested. The heliborne communications intercept

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rogram Element: #6.37.55.A

DOD Hission Area: #374 - Electronic Warfare - Multi-Mission Budget Activity: #4 - Tactical Programs Program Element: #6.37.55.A

and jamming mystem QUICK FIX was developed, tested, type classified standard A, and a production contract awarded. In addirion, a program to optimize the communications
receivers was completed. Development and Operational Testing, standard type classification,
and sward of procurement contract for the Tactical Army Communications Jammer (TACJAM) were accomplished. Procurement of and sward or procurement contract for the factical Army Lommunications Jammer (IACJAM) were accomplished. Frocurement or applications software for TACJAM and QUICK FIX automatic test equipment continued. System validation leading toward the applications surveile for resonn and quick rik aucomatic test equipment continued. System variations and noncommunications and noncommunications and noncommunications and noncommunications and noncommunications. was begun. Advanced Development for a series of expendable elections jammers was completed. A program to develop optimized communications tronic countermeasures (ECM) devices

- 2. FY 1982 Program: Efforts initiated in prior years will continue. Development of Automatic Test Equipment
 (ATE) software for QUICK FIX will continue. Advanced development of the Air Defense Electronic Warfare System (ADEWS)
 will begin. Development and operational tests of the

 will begin to an advanced to the Management of the Manag designed to
 expendable jammers will be conducted at Ft Huachuca, AZ. Advanced development of the HOMERUN
 will begin. The antenna mast program for the AN/MLQ-34 TACJAM system will be
 expendable jammers will begin.
 expendable jammers will begin.
- applications software for QUICK FIX will be completed. Development of expendable jammers for unattended platforms will begin. Development of an Air Defense Electronic Warfare System (ADEMS) will continue. The hand-emplaced expendable jammer to an Air Defense Electronic Warfare System (ADEMS) will continue. development will be completed, and the production in-process review held. Development of a system to counter will be completed.

Program Element: #6.37.55.A Title: Tactical Electronic Countermeasures Systems

DOD Mission Area: #374 - Electronic Warfare - Hulti-Mission Budget Activity: #4 - Tactical Programs

Technology and Support

4. FY 1984 Planned Program: Advanced development will continue in the HOMERUN the Air Defense Electronic Warfare System, unattended platform expendable jammers, and the countermeasures system against A program to provide of expendable jammers will enter advanced development. A program to expand the for QUICK FIX will begin.

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

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DK12

Title: Communications Electronic Countermeasures Systems

Program Element: #6.37.55.A DOD Mission Area:

73/4 - Electronic Warfare

Title: Tactical Electronic Countermeasures Systems
Budget Activity: 84 - Tactical Programs

Multi-Mission Technology and Support

DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to establish the technical fessibility and silitary potential of 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 associated with weapons systems, maneuver forces, and other threats of immediate concern to the commander. Overcoming current equipment deficiencies, which include

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. It provides for tactical systems which, by exploiting technical superiority, will serve as force multipliers to assist in offsetting Warsaw Pact numerical, mobility, and firepower superiority. A complementary mix of airborne and high-survivability ground assemblies will provide twenty-four-hour, all-weather coverage in depth.

- B. (U) RELATED ACTIVITIES: 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. Engineering development efforts of this project are accomplished in Program Element 6.47.50.A, Project DL12, Tactical Electronic Countermeasures Systems.
- C. (U) HORK PERFORMED BY: Major contractors are Analytics, Inc., Willow Grove, PA; GTE Sylvania, Mountain View, CA; ESL Incorporated, Sunnyvale, CA; Quest Research, McLean, VA. In-house development and contract monitoring are accomplished by the US Army Signals Warfare Laboratory, Warrenton, VA.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. FY 1981 and Prior Accomplishments: A heliborne communications intercept and jamming system, QUICK FIX 1A, was developed, tested, and three Quick Reaction Capability (QRC) models were deployed. Development of this system into a

Project: #DK12

Program Element: #6.37.55.A

Title: Communications Electronic Countermeasures Systems
Title: Tactical Electronic Countermeasures Systems
Budget A:tivity: #4 - Tactical Programs

DOD Hission Area: #374 - Electronic Warfare
Multi-Mission Technology and Support

capability to meet total Division and Brigade requirements is proceeding in accordance with developmental product improvements. The QUICK FIX IB, which upgrades the IA by the inclusion of an improved jamming system (the AN/TLQ-17A) successfully completed DT III and started OT III. The QUICK FIX II, which adds a direction-finding capability, has been developed, tested, type classified standard A, and a production contract for the first 10 QUICK FIX II systems in a Huey helicopter (EH-IX) was swarded. A ground-based tactical communications jammer, the AN/MLQ-34 (TACJAM), has been developed, tested, and type classified standard A. Developed G Series quick-erection (sixty-to-ninety seconds) antenna masts and assemblies which have been found applicable not only to communications or noncommunications ECM and signals intelligence equipment but also to other military systems. Began developmental product improvements to TACJAM to add a taking the lower frequency range from A program will be started to add the capability to TACJAM to effectively jam

- 2. FY 1982 Program: Development of Automatic Test Equipment (ATE) software for use in the AN/USM-410 general support EQUATE System for TACJAM and QUICK FIX will continue. Upgrade of the QUICK FIX systems will continue to improve jamming and direction-finding by development of a for use on a helicopter which will take advantage of the of the AN/TLQ-17A and attempt to improve upon the current Conduct advanced development of the sensing and guidance systems necessary to create a homing antirediation sensor (HOMERUN) targeted against

 Concept was demonstrated in the SUPERFLY program. Complete quick-errect antenna mast advanced development. The electronic countermeasures development will continue.
- 3. FY 1983 Planned Program. Efforts initiated in prior years will continue. Automatic test equipment applications software for TACJAM and QUICK FIX will continue. Development of the homing antiradiation system will continue, and airframe integration will begin. The electronic countermeasures program will move to Program Element 6.37.62.A., Electronic Warfare Feasibility Development. QUICK FIX jamming and direction-finding improvements will continue.
- 4. (U) FY 1984 Planned Program: Continue automatic test equipment software for TACJAM and QUICK FIX. Complete prototype development and integration of the homing anti-radiation sensor and conduct initial development and operational tests. Continue direction finding upgrade for QUICK FIX.
 - 5. (U) Program to Completion: This is a continuing program.

Title: Communications Electronic Countermeasures Systems
Title: Tactical Electronic Countermeasures Systems

Budget Activity: 14 - Tactical Programs

Project: #DK12
Program Element: #6.37.55.A

DOD Mission Area: #374 - Electronic Warfare
Multi-Mission Technology and Support

- 6. (U) Major Milestones: Not Applicable
- Resources (\$ in thousands):

RDTE	PY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in PY 1982	6624				Continuing	Not Applicable
submission)	5491			Not Shown	Continuing	Not Applicable

Quantities: Not Applicable

Increase in FY 1981 due to internal reprograming to conduct sensor interface development to allow electronic warfare equipment to interface with the All-Source Analysis Center.

Decrease in FY 1983 due to reprograming to higher priority Army programs.

Project: #DK12

Program Element: #6.37.55.A

DOD Mission Area: #374 - Electronic Warfare

Title: Communications Electronic Countermeasures Systems
Title: Tactical Electronic Countermeasures Systems

Budget Activity: #4 - Tactical Programs

Multi-Mission Technology and Support

Total FY 1981 FY 1982 FY 1983 FY 1984 Additional Estimated Actual Estimate **Betimate** Estimate to Completion Cost

Other Appropriations:

Other Procurement, Army***

Funds (current requirements)

Funds (as shown in FY 1982

submission)

61000

62700

Not Shown

Other Appropriations:

Quantities (current requirements) 25 Quantities (as shown in FY 1982

submission)

Not Shown

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***Punds/quantities shown are for TACJAM. (See Descriptive Summary for Program Element 6.37.55.A.) Reductions in FY 1981 and FY 1982 are due to reprograming to higher priority Army programs.

FY 1983 funds were eliminated because an analysis of planned production rates and production reorder leadtimes determined that the maximum delivery rate of two systems per month could be maintained without the FY83 funds.

Funds were added on FY 1984 to continue the program to equip the active force.

* Quantity determined subsequent to submission of FY 83 Procurement Annex.

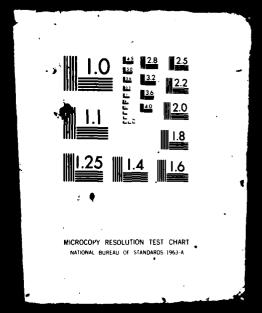
Project: #DK12 Program Element: #6.37.55.A DOD Mission Area: #374 - Electro Multi-Mission	Title: Communications Electronic Countermeasures Systems Title: Tactical Electronic Countermeasures Systems are Budget Activity: 44 - Tactical Programs gy and Support					
	FY 1981 Actual	FY 1982 Retimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Latimated Cost
Aircraft Procurement, Army****						
Funds (current requirements) Funds (as shown in FY 1982	0					•
submission)	0					
Quantities (current requireme Quantities (as shown in FY 19						
submission)	0	•				

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****Funds/quantities shown are for QUICK FIX/BLACKHAWK (UH-60A) sircraft. (See Descriptive Summary for Program Element 6.37.55.A.) Changes in funding and quantities are to reflect BLACKHAWK production.

DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/G 5/1 DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT TEST & EVALUA--ETC(U) AD-A114 688 UNCLASSIFIED DA-PAM-5-6-1-VOL-2 NL 5·· 7

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: / DK13

Title: Non-Communications Electronic Countermeasures Systems

Program Element: # 6.37.55.A

Title: Tactical Electronic Countermeasures Systems

DOD Mission Area: # 374 Electronic Warfare

Budget Activity: #4 - Tactical Programs

Multi-Mission Technology and Support

A. DETAILED BACKGROUND AND DESCRIPTION: This project funds the advanced development of noncommunications electronic countermeasures systems. These systems include jammers targeted against

Systems will be both ground mounted and carried by attended and unattended airborne platforms. The major effort under this project will be advanced development of the Air Defense Electronic Warfare System (ADEWS). ADEWS is designed to

The system will provide these

to Army Air Defense elements and

This project also funds extensive tactical soft-

ware support efforts.

- B. (U) <u>RELATED ACTIVITIES</u>; Exploratory work is conducted under Program Element 6.27.15.A, Tactical Electronic Warfare Technology. Programs transition to Program Element 6.47.50.A, Tactical Electronic Countermeasures Systems, for engineering development. Coordination is maintained between the Services to maximize the interchange of technical data to eliminate any unnecessary duplication of effort. Coordination is accomplished through working panels of the Technical Cooperation program, the Joint Tri-Service Electronic Warfare Panel, and program reviews conducted by the Secretary of Defense (Under Secretary of Defense for Research and Engineering).
- C. (U) WORK PERFORMED BY: US Army Electronic Warfare Laboratory, Fort Monmouth, NJ. The contractor for the Air Defense Electronic Warfare System will be decided in FY 1982.

Title: Non-Communications Electronic Countermeasures Systems Title: Tactical Electronic Countermeasures Systems

Project: # DK13
Program Element: # 6.37.55.A DOD Mission Area: # 374 Electronic Warfare

Budget Activity: #4 - Tactical Programs

Multi-Mission Technology and Support

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: This program has been used to establish the software support centers at the Electronic Warfare Laboratory, Fort Mormouth, NJ, and the Signals Warfare Laboratory, Vint Hill Farms Station, Warrenton, VA. Development of mensor interfaces to the All-Source Analysis Center and the software to support these interfaces was initiated.
- FY 1982 Program: The Air Defense Electronic Warfare Systems (ADEWS) will transition to advanced development. The system effectiveness simulation and system design plan were done under Program Element #6.27.15.A, Electronic Warfare Technology. The ADEWS development will consist of

Present plans are to complete two advanced development models. Tactical software support will include development of a computer threat generator for simulating the hostile threat environments.

- 3. (U) FY 1983 Planned Program: The ADEWS development will complete subsystem design and critical subsystem fabrication and laboratory tests. ADEWS system integration will begin. The computer threat generator development will be completed and evaluations will be started. An ADA language compiler will be installed in the system.
- 4. (U) FY 1984 Planned Program: Complete ADEMS system integration and conduct initial development and operational tests. Develop threat simulator software for tactical anothware support.
 - 5. (U) Program to Completion: This is a continuing program.
 - 6. (U) Major Milestones: (ADEWS)

Major Hilestones Contract Award DT I/OT I

Current Milestone Dates 2nd Quarter FY 1982 2nd Quarter FY 1984

Milestone Dates Shown in FY 1982 Submission Not Shown Not Shown

Title: Non-Communications Electronic Countermeasures Systems
Title: Tactical Electronic Countermeasures Systems
Budget Activity: \$4 - Tactical Programs

Project: # DK13
Program Element: # 6.37.55.A
DOD Mission Ares: # 374 Electronic Warfare

Multi-Mission Technology and Support

Resources (\$ in thousands):

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1982	2824	3737			Continuing	Not Applicable
submission)	2848	3747	-	No t Shown	Continuing	Not Applicable

Reductions in FY 1981 and FY 1982 are due to adjustments for inflation. Reduction in FY 1983 due to higher priority requirements.

Other Appropriations: Not Applicable.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # DK14

Program Element: # 6.37.55.A

Title: Expendable Jammers
Title: Tactical Electronic Countermeasures Systems

DOD Mission Area: #374 - Electronic Warfare - Multi-Mission, Budget: #4 - Tactical Programs Technology and Support

DETAILED BACKGROUND AND DESCRIPTION: This project funds the advanced development of a series of expendable electronic warfare (ZM) equipment capable of disrupting hostile tactical communications and noncommunications systems and capable of being emplaced behind enemy lines by artillery, unattended/airborne (U/A) platforms and/or by hand. The basic advantages of expendables are: . - Can be quickly and accurately deployed in close proximity to hostile communication and noncommunications systems; 2 - Are capable of disrupting these hostile systems without compromising US Army ground and sirborne troop locations; 3 - Will not normally interfere with friendly equipment due to low power output and distant emplacement of the devices. The expendable electronic counter-countermeasures (ECM) capability will consist of a mix of barrage and automatic scan/lock-on ism types

There is also a requirement for the development of the sensing and guidance systems necessary to create a howing antiradiation sensor to be targeted against

- B. (U) RELATED ACTIVITIES: Exploratory development work is conducted under Program Element 6.27.15.A. Tactical Electronic Warfare Technology. Programs transition to Program Element 6.47.50.A, Tactical Electronic Countermeasures Systems, for engineering development. Coordination is maintained between the Services to maximize the interchange of technical data and minimize duplication of effort. Coordination is accomplished through working panels of the Technical Cooperation program, the Joint Tri-Service Electronic Marfare Panel, and program reviews conducted by the Secretary of Defense (Under Secretary of Defense for Research and Engineering).
- C. (U) MORK PERFORMED BY: The prime contractors performing work on the EXJAM program are Motorola, Inc., Scottsdale, AZ, for Artillery-Delivered Smart Set-On EXJAM; Fairchild, Long Island, NJ, for Artillery-Delivered barrage EXJAM; and Sanders Associates, Mashua, MH, for Microwave EXJAM. The in-house developing organizations within the US Army Electronics Research and Development Command (ERADCOM) are the Electronics Warfare Laboratory (EWL), Ft Monmouth, NJ, for the Artillery-Delivered Smart Set-On and Microwave EXJAM; US Army Electronics Research and Development Command - Signal Warfare Laboratory (SWL), Warrenton, VA, for the Artillery-Delivered Barrage EXJAH; and US Army Electronics Research and Development Command - Harry Dismond Laboratories (HDL), Adelphi, MD, for the Artillery-Delivered Barrage EXJAM.

Project: # DK14

Title: Expendable Jammers

Program Element: # 6.37.55.A

Title: Tactical Electronic Countermeasures Systems

DOD Mission Area: #374 - Electronic Warfare - Multi-Mission, Budget: #4 - Tactical Programs
Technology and Support

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. FY 1981 and Prior Accomplishments; Hand-emplaced barrage and smart expendable jammers advanced development completed in FY 1980 and transitioned to engineering development. Development of an artillery-delivered scan lock-on jammer was started. Eighteen scan lock-on devices were delivered in FY80 for in-house government testing. A feasibility model of a microwave (RADAR) expendable jammer (EXJAM) against specified threats was developed. Contracts were awarded in FY80 for the advice and a microwave device. During FY81, designs were finalized and approved, and initial prototypes of the evaluation. Development of a scan lock-on EXJAM hegan in second quarter FY81. Artillery EXJAM dispersion techniques completed field tesing. During FY81, designs were finalized and approved, and initial prototypes of the artillery delivered and microwave jammers were delivered for government evaluation. Development of a scan lock-on EXJAM began in second quarter FY81.
- 2. FY 1982 Program: Fabrication and documentation for the advanced development (AD)
 | and the microwave EXJAM will be completed. The development test/operational test (DT/OT) I and the validation in-process review (IPR) for each of these devices will be completed, and a transition decision, to engineering development, will be made. All necessary experimental work will have been performed, and these EXJAM programs will be ready for full-scale development.
- 3. FY 1983 Planned Program: Development of an airborne platform carried and seeded barrage and scan lock-on communications EXJAM will begin. These systems will supplement current conventional standoff jamming systems and provide an all- weather electronic countermeasures capability to attack targets. The artillery-delivered EXJAM will transition to engineering development.
- 4. FY 1984 Planned Program: Continue advanced development of the airborne platform barrage and lock-on EXJAM programs. Hardware will be delivered and integration will begin. Begin advanced development of unattended radar (sammers with high-speed reaction times.
 - 5. (U) Program to Completion: This is a continuing program.

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Title: Expendable Jammers

Project: # DK14
Program Element: # 6.37.55.A Title: Tactical Electronic Countermeasures Systems DOD Mission Area: #374 - Electronic Warfare - Multi-Mission, Budget: #4 - Tactical Programs Technology and Support

- 6. (U) Major Milestones: Not Applicable.
- Resources (\$ in thousands):

RDTE ·	PY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	PY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1982	0				Continuing	Not Applicable
submission)	0			Not Shown		•

The FY 1982 reduction is due to a revision of the estimate for inflation. The FY 1983 reduction is due to reprograming to higher priority Army programs, and moving the homing antiradiation sensor (HOMERUN) program to DK12. This is a continuing program. As foreign communications systems are upgraded, countermeasures are developed under Program Element 6.27.15.A, Tactical Electronic Warfare Technology. The expendable jammer advanced development efforts to counter these foreign communications upgrades are then conducted under this project. The goal of our electronic warfare programs is to keep abreast of the threat so that when new foreign communication systems are fielded, the US has a countermeasure ready. The next thrust will be in the area of countermeasures to

Other Appropriations: Not Applicable.

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.64.A

DOD Mission Area: #276 - Defensive Chemical and Biological Systems

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

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	36189	30430	Continuing	Not Applicable
D995	Medical Chemical Defense Life Support Materiel	0	0	36189	30430	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This new advanced development program element is essential to develop Department of Defense capability to provide medical defense against chemical warfare agents. The US Army Medical Department, acting as the Department of Defense executive agent, has the responsibility for developing medical life support materiel to meet joint service requirements to meet the threat of the chemical battlefield. This chemical threat will be met by the development and ultimate fielding of a comprehensive package of compounds, therapeutics, and antiradiation drugs to provide maximum soldier survivability on the integrated battlefield.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: An extranural program will be established with the requested funds for development of an industrial manufacturing base to produce large standard lots of pharmaceutical-grade compounds having potential as antidotes, prophylaxes, therapeutic and pretreatment compounds, decontaminants, and radio-protective drugs. The industrial base will include drug synthesis, pilot plant organization and operations, drug formulation, and stability testing. In addition, final safety, efficacy and toxicity studies will be performed in support of an Investigational New Drug (IND) application to the Food and Drug Administration (FDA).

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Program Element: #6.37.64.A

DOD Mission Area: #276 - Defensive Chemical and

Biological Systems

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

Continuing

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands) Additional FY 1981 FY 1982 FY 1983 To Completion

Total Estimated Cost

Not Applicable

RDTE Funds (current requirements) Funds (as shown in FY 1982 submission)

New start in FY 1982

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

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Program Element: #6.37.64.A

DOD Mission Area: #276 ~ Defensive Chemical and

Biological Systems

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

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The mission for medical chemical defense was transferred from the US Army Materiel Development and Readiness Command to the US Army Medical Department in July 1979. The US Army Medical Research and Development Command was subsequently assigned the task of preparing and programing a comprehensive, integrated, and phased medical research and development effort to insure maximum survivability of the soldier on the chemically contaminated battlefield, thus maintaining our tactical advantage. This project represents one phase of this program for medical defense against chemical agents. Funding is required to establish the industrial base necessary to develop those compounds showing promise during exploratory development as potential antidotes, prophylaxes, pretreatment and therapeutic compounds against chemical warfare agents. This funding is desperately needed to involve the pharmaceutical industry to meet the unique manufacturing requirements demanded by the variety of compounds necessary to counteract the Warsaw Pact chemical warfare threat. Without this funding, US industry is not likely to satisfy military requirements to develop a system of antidotes against chemical warfare agents. Industrial base development consists of the capability of drug synthesis and pilot plant organization and operations, within the framework of Good Manufacturing Practice (GMP) guidelines and environmental/safety criteria. These controls are necessary for the production of large standard lots of pharmaceutical-grade compounds necessary to meet Food and Drug Administration (FDA) drug development requirements. These compounds will then be used to conduct final safety, efficacy, and toxicity studies in animals in support of an Investigational New Drug (IND) application to the FDA. Following FDA approval, phase I clinical trials will be conducted to provide tolerance (toxicity), safety, and bioavailability data in humans.
- G. (U) RELATED ACTIVITIES: Program Element 6.11.02.A, Defense Research Sciences, Project BS10, Military Disease, Injury, and Health Hazards; Program Element 6.27.34.A, Medical Defense Against Chemical Agents, Project A875, Medical Defense Against Chemical Agents; and Program Element 6.37.51.A, Medical Defense Against Chemical Warfare, Project D993, Medical Defense Against Chemical Warfare supports the Program Element/Project. The US Army Medical Research and Development Command avoids duplication of effort within the Army by central management of the Program on the Medical Aspects of Chemical Defense. Interservice duplication is avoided by coordination and collaboration with the Air Force and Navy as required of the Army as the Executive Agency for the D00 Chemical Defense effort. Such coordination is accomplished within the framework of a Memorandum of Agreement with the Air Force and through the Joint Technology Coordination Group for Medical Chemical Warfare Defense of the Armed Services Biomedical Research Evaluation and Management Committee. All work is also coordinated with quadripartite and NATO nations through meetings and data exchange annexes.

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Program Element: #6.37.64.A

DOD Mission Area: #276 - Defensive Chemical and
Biological Systems

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

- H. (U) WORK PERFORMED BY: This is a new start in FY 1983. No contractors nor in-house efforts are currently funded by this Program Element/Project.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 1981 and Prior Accomplishments: Not applicable.
- 2. (U) FY 1982 to FY 1984 Program: FY 1983 will be the first year of this advanced development effort to provide an effective medical system for maximizing safety and survivability of the soldier on the chemical battlefield. The funding will support establishment of an industrial base in the US for the production of pharmaceutical-grade compounds identified in exploratory development to be effective as chemical warfare agent antidotes, prophylaxes, therapeutic and pretreatment drugs, and to support final safety, efficacy, and toxicity studies in animals. These data will support an Investigational New Drug application which will permit phase I clinical trials to obtain necessary human data to include tolerance, safety, and bioavailability of the new drugs. Several new compounds will be studied during this period in order to provide protection for the soldier from the various nerve, blister, and cyanide agents known to be in the inventory of the Warsaw Pact countries.
- 3. (U) Program to Completion: It is anticipated that this will be a continuing program to develop new treatment regimens identified through basic research and exploratory development efforts in the medical chemical defense program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.66.A

DOD Mission Area: #322 ~ TIARA For Tactical Land
Warfare

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

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 9955	FY 1982 Estimate 6530	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
D907	QUANTITIES Tactical Electronic Surveillance Systems	9955	6530			Continuing	Not Applicable Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program (PE 6.37.66.A/D907) was in Program Element 6.37.45.A prior to FY 1983. The program encompasses the Army's Tactical Exploitation of National Capabilities (TENCAP) initiatives. The scope of the program is to identify and/or refine initial design concepts and to provide for advanced development through prototype fabrication and testing. The past decade has witnessed major technical advances and the introduction of increasingly sophisticated weapons and intelligence-gathering systems into the strategic and tactical operations of military forces both friendly and opposing force. Army commanders at all echelons must have an intelligence system which will provide early detection, identification, and location of these enemy critical nodes in order to employ our own forces and weapons for effective enemy attrition. The systems in this program provide for the development of strategi: intelligence collection interfaces with tactical operations. Advanced techniques are applied to exploit information from a variety of 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 assist the commander in defeating the enemy.

C. (U) BASIS FOR FY 1983 RDTE REQUEST: Continue investigation of applications to exploit strategic sensor programs.

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Program Element: #6.37.66.A

DOD Mission Area: #322 - TIARA For Tactical Land
Warfare

Title: Tactical Electronic Surveillance Systems
Budget Activity: 44 - Tactical Programs

Based on the Interim Tactical Electronics Intelligence (ELINT) Processor (ITEP) experience and strategic systems advanced configuration, initiate design for a fully operational Tactical Electronics Intelligence (ELINT) Processor (TEP) in consonance with the future strategic sensor mix and the All Source Analysis System.

D. COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	9955			Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	9955	11657		Continuing	Not Applicable

The decrease in FY82 is due to the application of revised inflation and civilian pay pricing indices and Congressionaly directed reduction.

The decrease in FY 1983 is due to cancellation of FY83 portion of an effort that was to begin in FY82 but was disapproved by Congress in the FY82 budget.

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

Program Element: #6.37.66.A

DOD Mission Area: #322 - TIARA For Tactical Land
Warfare

Title: Tactical Blectronic Surveillance Systems
Budget Activity: 14 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This project supports the Army's Tactical Exploitation of National Capabilities (TENCAP) program advanced development (AD) 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: Related developments are conducted by the Air Force, Navy, and national agencies.

 Coordination is effected by the exchange of technical reports, attendance at acientific meetings and conferences, joint participation in subgroups and working panels. In addition, formal requirements documents of each Service are exchanged, reviewed, and commented upon by other Services. Coordination is also accomplished as part of the program reviews conducted by the Office of the Secretary of Defense (Under Secretary for Research and Engineering).
- 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, Ft Monmouth, NJ; MRJ, Inc., Fairfax, VA.
- I. (U) PROGRAM ACCOMPLISHMENTS AND PUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Studies were completed. System design was completed to interface with two strategic electronic surveillance systems. Two Interim Tactical ELINT Processors (ITEP's) were developed and deployed for operational evaluation and limited operational capability. Developmental efforts were continued to improve strategic sensor interfaces to enhance tactical utility.

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Program Element: #6.37.66.A

DOD Mission Area: #322 - TIARA For Tectical Land
Warfare

Title: Tactical Electronic Surveillance Systems
Budget Activity: 14 - Tactical Programs

- 2. (U) FY 1982 Progrem: Continue ITEP operational evaluation. Deploy additional ITEP systems. Continue joint programs to enhance tactical utility of strategic systems.
- 3. (U) FY 1983 Planned Program: Continue joint programs to enhance tactical utility of strategic systems. Based on Interim Tactical ELINT Processor (ITEP) experience and strategic systems advanced configuration, initiate designs for fully operational tactical ELINT Processor (TEP) to be developed in consonance with the future strategic sensor mix and the All Source Analysis System.
- 4. (U) FY 1984 Planned Program: Continue analysis of strategic mensors and advanced development of strategic interfaces. Continue development of fully operational Tactical ELINT Processor (TEP) in consonance with strategic mensors and the All Source Analysis System.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.02.A DOD Mission Ares: 1212 - Indirect Fire Support Title: Aircraft Weapons
Budget Activity: #4 - Tactical Programs

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

Project Number Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 6571	FY 1982 Estimate 3495	FY 1983 Estimate 686	FY 1984 Estimate 576	Additional to Completion	Total Estimated Cost 50545
DL62 Aircraft Rocket Subsystems	3893	2876	686	576	0	277 e 3
D133 Aircraft Gun-Type Weapons	2678	619	0	0	0	22804

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This propram is needed to support the development and test of improved alreaft weapon subsystems, excluding missiles. The program is necessary in order to support the continuing requirement for low-cost, reliable, easily maintainable, lightweight, increasingly effective armament subsystems of advanced design for attack helicopters. The development and testing of new rocket (2.75 inch) warheads and an improved motor will be accomplished for use as secondary armsment capability on both the AR-IS and AH-64 attack helicopters.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Basic rocket trajectory data will be acquired for integration in aircraft fire controls. Environmental and aircraft induced parameters affecting rocket trajectory will be defined. Twaluation of several factors not currently incorporated in the trajectory equation will be initiated. These equations must be developed to overcome deficiencies in delivering rockets accurately. Trajectory constants for the different rocket motor/warhead combinations will be developed and refined. Fire control computer information will be developed to produce the read-only trajectory data cards required for future production aircraft and for upgrading the fire control computers of fielded aircraft, and to upgrade the Rocket Management System data cards. Recommended changes to the Rocket Management System thumbwheel to reflect changes in rocket (motor/warhead/fuze) configuration will be obtained. The type classification action for the 30mm High-Explosive Dual-Purpose (XM789) assumition will be completed by conducting in-process reviews (IPR) for type classification by examining the technical data package for suitability for competitive procurement and by transitioning the item to single service manager.

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Program Element: # .42.02.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Aircraft Weapons
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1982	6571	3495	686	576	50545
submission)	5075	3504	729	1517	50044

The FY 1981 increase reflects reprograming action to fund special effort to solve problems encountered during prequalification testing of the high-explosive dual-purpose 30mm Ammunition (XM789). These developmental problems resulted in schedule slip of approximately 12 months establishing the additional funding requirement for FY 1982 to complete this development leading to type classification. The FY 1982 and FY 1983 decreases are a result of the amended budget request and application of revised inflation and civilian pay pricing indices.

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

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Program Element: #6.42.02.A
DOD Mission Area: #212 - Indirect Fire Support

Title: Aircraft Weapons
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program supports the development of new gun and rocket weapons subsystems for Army Aircraft. The requirement is for reliable, low-cost, easily maintainable, minimum drag, lightweight armament subsystems of advanced design that provide sufficient standoff range and effectiveness. The submunition warhead element provides multipurpose lethality against personnel, material, and lightly armored targets. Analysis and firings to date indicate a net result of the improvements will be an increase in antipersonnel lethality of greater than 50-1 when compared to the current standard systems. The 19-tube lightweight launcher has a 50% weight reduction compared with the current 19-tube launcher and the lightweight launcher is compatible with the current and improved families of rocket: The 30mm ammunition element provides a lethal combat round with both shape charge and high-explosive capability for use by the Attack Helicopter (AAR) and the current US Marine Corps Harrier. This ammunition will be interoperable in NATO Gun Systems.
- G. (U) RELATED ACTIVITIES: Close lisison is maintained with the other services and industry to avoid duplication of effort. The Army participates in the Tri-Service Joint Technical Coordinating Group for Air-Launched Non-Nuclear Ordnance, an organization chartered at the major field command level. This group provides a medium for exchange of technical information and determination of joint use implications. An Army representative serves on the Air Munitions Requirements and Development Committee, an organization within the Office of the Secretary of Defense. One of the functions of this committee is the establishment of joint service requirements and development of air munitions. Related Program Elements are 6.47.07.A, Advanced Attack Helicopter; 6.42.12.A, COBRA/TOH; 6.32.06.A, Aircraft Wespons; and 6.22.01.A, Aircraft Wespons Technology.
- H. (U) WORK PERFORMED BY: Contractors: Hughes Aircraft Company, Canoga Park, CA; Norris Industries, Los Angeles, CA; Hercules Incorporated, Radford, VA; Hi-Line Plastics, Incorporated, Olathe, KS; Comin Industries, Sheboykan, WI; Hughes Helicopters, Culver City, CA; Honeywell Incorporated, Minnespolis, MN. of the effort. In-house organizations: US Army Aviation Research and Development Command, St. Louis, MO; US Army Missile Research and Development Command, Dover, NJ; US Army Missile Research and Development Command, Huntaville, AL; Naval Ordnance Station, Indian Head, MD; Lake City Ammunition Plant, Lake City, MD; Project Manager, Advanced Attack Helicopter, St. Louis, MO, Project Manager, COBRA/TOW, St. Louis, MO.

I. (U) PROGRAM ACCOMPLIS MENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Initiated development of: new family of 2.75-inch rocket warheads with remote set fuzing capability; a training practice, high-explosive, dual-purpose 30mm ammunition round, interoperable in the NATO 30mm guns, for attack helicopters. Completed development of the 2.75-inch Lightweight Rocket Launcher for attack

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Program Element: #6.42.02.A
DOD Mission Area: #212 - Indirect Fire Support

Title: Aircraft Weapons
Budget Activity: #4 - Tactical Programs

halicopters. This Rocket Lightweight Launcher will be compatible with the new Remote Settable Fuze on the 2.75-inch Rocket Systems. Completed development 30mm High-Explosive Incendiary Ammunition (XM799) for the USHC for use in Harrier Aircraft. Resolved problems associated with the High-Explosive Dual-Purpose (HEDP) Ammunition in bore explosions which allowed the Army to move to qualification testing of the ammunition. The multipurpose submunition warhead (XM261) and improved rocket motor development for the 2.75-inch rocket was completed. Static, ejection, fragmentation, and armor penetration tests were conducted on submunitions. Puzes and ballute assemblies were wind tunnel and flight tested. The MK66 rocket motor with the NM261 and H151 warheads were wind tunnel tested. DT/OT II test was completed and Type Classification of the XM261 with the new MK66 rocket motor was initiated.

- 2. (U) FY 1982 Program: The type classification of the improved rocket motor will be completed. The technical data package will be updated. Basic rocket trajectory data for the multipurpose submunition warhead will be acquired for integration into the AH-1S fire control. The high-explosive, dual-purpose (HEDP) ammunition will be type classified. Detailed examination of the technical data package will be conducted to assure suitability for competitive procurement and transition to single service manager.
- 3. (U) FY 1983 Planned Program: Refinement of the multipurpose submunition rocket trajectory data for the warhead, improved rocket motor, and AH-18 combination will be initiated. Production actions will be initiated pending availability of funds.
- 4. (U) PY 1984 Planned Program: Initiate development of Smoke Screen and Illumination warhead with remote act fuze capability.
- 5. (U) Program to Completion: Full engineering development efforts will be continued for illumination and smoke warheads and are scheduled for completion in FY 1985.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.04.A DOD Mission Area: #218 - Land Warfare Associated Air

#218 - Land Warfare Associated Air Mobility Title: Air Mobility Support Equipment
Budget Activity: 74 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	PY 1981 Actual 508	FY 1982 Estimate 2308	FY 1983 Estimate 2245	FY 1984 Estimate 6357	Additional To Completion Continuing	Total Estimated Costs Not Applicable
DC32	Ground Support Equipment	0	619	856	4039	Continuing	Not Applicable
		-					
DC33	Cargo Handling Equipment	355	923	444	774	Continuing	Not Applicable
DC45	Aviation Life Support					-	- •
	Systems	153	766	945	1544	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The US Army must not only develop aviation systems for increased firepower and mobility, but also develop the support equipment required to gain maximum effectiveness from these systems and their crews. This program provides for engineering development of new ground support equipment, Aviation Life Support Equipment (ALSE), and cargo-handling equipment to improve the efficiency and survivability of aircrews in Muclear, Biological, Chemical (MBC), and adverse climatic environments and provides for cargo-handling and ground support equipment to increase aircraft effectiveness and operational readiness. This program element includes: (1) the Full-Scale Engineering Development (FSED) of ground support equipment designed to improve the maintenance and servicing capability for the Army aircraft fleet; (2) the FSED of ALSE for aircraft and individual crewmembers to enhance their efficiency, safety, and survivability while operating in a hostile tactical, NBC, or climatic environment; and (3) the FSED of cargo-handling equipment to reduce current deficiencies in the loading and movement of cargo by helicopter in forward battle areas. These projects support a reduction of support equipment by the development of standardized items applicable to more than one aircraft system.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Ground Support Equipment: The FY 1983 request will fund the continuation of Full-Scale Engineering Development (FSED) of the following three items of equipment: the Small Portable Diagnostic Equipment (SPADE); the Aircraft Decontamination, Deicing and Cleaning System (ADDCS); and the Mon-Divisional Aviation

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Program Element: #6.42.04.A

DOD Mission Area: #218 - Land Warfare Associated Air
Mobility

Title: Air Mobility Support Equipment
Budget Activity: #4 - Tactical Programs

Intermediate Maintenance Tool/Shop Set (Non-Div AVIM). The SPADE is being developed to diagnose the condition of selected helicopter drive train bearings, a task which currently must be performed by inefficient and time-consuming manual and oil analysis techniques. The ADDCS development will provide a functionally integrated piece of equipment to accomplish sircraft decontamination after exposure to nuclear, biological, or chemical weapons effects, ground deicing in a cold climate environment, and the capability to clean aircraft exteriors and selected components. The Non-Div AVIM Shop Set will complete the three-level maintenance concept used by US Army Aviation by replacing obsolete, van-mounted shops used by nondivisional AVIM units with a mobile shop aet housed in rigid-walled, standardized shelters which are air transportable by US Air Force (USAF) sixraft and Army helicopters. Aviation Life Support Equipment: FSED will be initiated for an On-Board Oxygen Generating System to provide Special Electronic Mission Aircraft (SEMA) a high-altitude oxygen system having significantly reduced logistics requirements. SEMA aircraft must maintain a standoff distance from the FEBA for survivability and operate at higher mission altitudes. Testing will be conducted on this system as installed in the RV-ID/RU-21 aircraft. FSED will continue on the Aircraft Hodular Survival System and a Flostation Kit for Helicopter aircrews. FSED will be completed on a Helicopter Oxygen System (HOS) to provide high-altitude capability for selected Army Aviation rotary-wing units having a high-altitude mission; e.g., mountain search and rescue. Cargo-Handling Equipment: FSED will continue on a cargo-handling system for CH-47 cargo helicopters that will provide a rapid loading capability and an efficient restraint system for internal cargo.

D. (U) COMPARISON WITH PY 1982 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1981	PY 1982	FY 1983	Additional To Completion	Total Estimated Cost
Funds (current requirements)	508	2308	2245	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	1177	3010	3958	Continuing	Not Applicable

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Program Element: #6.42.04.A

DOD Mission Area: #218 - Land Warfare Associated Air

Mobility

Title: Air Mobility Support Equipment
Budget Activity: 44 - Tactical Programs

The reduction of \$669 thousand in FY 1981 is a result of reprograming to higher priority Army requirements. The reduction of \$702 thousand in FY 1982 is the result of reduced ground support equipment funding in the amended budget request and the application of revised inflation and civilian pay pricing indices. The reduction of \$1713 thousand in FY 1983 is the result of a reduction in scope of both the ground support and cargo-handling projects combined with a slight increase in scope in Aviatio. Life Support Equipment.

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

	FY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Aircraft Procurement, Army:						
Non-Divisional AVIM Shop Complex						
Funds (current requirements)	0	0	3900	10200	16200	30300
Quantities (current						
requirements)	0	0	3	10	12	25
Small Portable Analyzer						
and Diagnostic						
Equipment						
Funds (current requirements)	0	0	0	1800	10200	12000
Quantities (current						
requirements)	0	0	0	96	440	536

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Program Element: #6.42.04.A

DOD Mission Area: #218 - Land Warfare Associated Air
Hobility

Title: Air Mobility Support Equipment
Budget Activity: 44 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this composite program element is to continue into Full-Scale Engineering Development (FSED) those concepts in ground support equipment, Aviation Life Support Equipment (ALSE), and cargo-handling equipment that have undergone advanced development and/or a validation In-Process Review (IPR) and have demonstrated the most promise in meeting the Army's prioritized needs in these areas. The FSED effort in ground support equipment is designed to provide the Army with new equipment and procedures applicable to the servicing and maintenance of Army aircraft. Specific items include the Small Portable Analyzer Diagnostic Equipment (SPADE) to diagnose the condition of selected helicopter drive train bearings; the Aircraft Decontamination Deicing and Cleaning System to prowide an integrated system for ground decontamination following exposure to nuclear, biological, or chemical weapons, deicing of rotor blades and aircraft structure, and cleaning of the aircraft and selected components; and a Non-Divisional Aviation Intermediate Maintenance Shop set to replace the current obsolete set which is housed in an aging fleet of wans and whose mobility is incompatible with current Aviation Unit Maintenance (AVUM) and Divisional Aviation Intermediate Maintenance (AVIN) sets. This effort also includes FSED of the Helicopter Ski Set and in FY 1984 the transition to FSED of a Helicopter Battle Damage Repair System (HBDR). Aviation Life Support Equipment (ALSE): The ALSE project was established to consolidate, manage, and execute the FSED of all equipment designed to sustain aircrews and passengers in their flight environment. This project includes special sircraft systems, components common to multiple sircraft, and equipment worn by aircraws. Specific efforts include FSED of a Helicopter Oxygen System (HOS) for aviation units having high-altitude mission requirements; e.g., mountain search and rescue and an On-Board Oxygen Generating System (OBOGS) to reduce the logistic support required for Special Electronic Mission Aircraft (SEMA) which must operate at higher altitudes to accomplish their mission. Efforts also include PSED of a Helicopter Floatation Kit and an Aircraft Modular Survival System. New developments which will transition to FSED in the FY 1984 timeframe include a joint Army/Navy program to provide an Inflatable Body and Head Restraint System (IBAHRS) for the AH-IS and AH-64 sircraft and a new Integrated Aircrew Helmet System (IAHS) for improved crash protection, noise attenuation, and communications capabilities and improved interface with protective systems for nuclear flash, chemical, biological, and laser threats. Phase I of a program to integrate a number of life support modules and concepts into a functionally compatible system, the Aviation Life Support System, Integrated Battlefield (ALSSIB) is planned for FSED during this timeframe. Cargo-Handling Equipment: This effort is designed to develop and field equipment items including nets and slings for helicopters that will provide efficient and rapid movement of equipment and supplies to and within forward areas. Specific FSED projects include the Internal Cargo Handling System for CH-47 cargo helicopters to provide an efficient means of loading, unloading, and securing internal loads; a Container Helicopter External Lift System (CHELS) for the CH-47 helicopter; and the Low Visibility External Load Acquisition System (LOVLAS) for cargo and utility helicopters to improve the ability to acquire external loads quickly under low-visibility weather conditions.

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Program Element: #6.42.04.A

DOD Mission Ares: #218 - Land Warfare Associated Air
Hobility

Title: Air Mobility Support Equipment
Budget Activity: #4 - Tactical Programs

- G. (U) RELATED ACTIVITIE: Program Elements 6.32.09.A, Air-Mobility Support; 6.22.09, Aeronautical Technology; and 6.22.10.A, Airdrop Technology, are closely coordinated through the actions of the annual OSD Apportionment Review of Aeronautical Technology and the Joint Technical Airdrop Group. Aviation Life Support Equipment is coordinated through the US Army Materiel Development and Readiness Command/US Army Training and Doctrine Command (DARCOM/TRADOC) Life Support Steering Council and the US Army Aviation Research and Development Command (AVRADCOM)/TRADOC Joint Working Group for Aviation Life Support Equipment (ALSE) Development. Duplication of effort is avoided through coordination of Joint Working Groups composed of development activity representation of all services; e.g., Tri-Service Management Council for Aviation Life Support Equipment.
- H. (U) WORK PERFORMED BY: H. Koch and Sons, Anaheim, CA; Boeing-Virtol, Ridley Park, PA; Sikorsky Aircraft Company, Stratford, CT; Kaman Aviation, Windsor Locks, CT; Bell Helicopter, Dallas, TX; Martin Marietta, Baltimore, MD; Fiber Science, Salt Lake City, UT; Air Research, Phoenix, AZ; Whitehill Mfg Corp, Lima, PA; and Carleton Controls Corp, NY.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Ground Support Equipment: There was no funding or planned effort for Ground Support Equipment in 1981. Aviation Life Support Equipment: Continued development of the Floatstion Kit for Helicopter Aircrews. Awarded a contract for engineering development of the Helicopter Oxygen System in mid-FY 1981. Cargo/Handling Equipment: Conducted preliminary planning, prototype fabrication, and initial user evaluation for the Internal Cargo/Handling System. Conducted preliminary planning for the Cargo Helicopter External Lift System.
- 2. (U) FY 1982 Program: Ground Support Equipment: Engineering development will be initiated for the design and fabrication of an Aircraft Decontamination, Deicing and Cleaning System (ADDCS). Full-Scale Engineering Development (FSED) will be initiated for hardware design and fabrication of the Small Portable Analyzer Diagnostic Equipment (SPADE). Design and fabrication of the Non-Divisional, Aviation Intermediate Maintenance (AVIM) Tool/Shop complex will be initiated. Aviation Life Support: Conduct DT/OT II testing of the Helicopter Floatation Kit. Continue FSED for the Helicopter Oxygen System (HOS) for UH-1, OH-58, CH-47, and UH-60 aircraft. Initiate FSED for an On-Board Oxygen Generating System (OBOCS) to support RV-1D/RV-21 high-altitude mission requirements. Award an FSED contract for the aircraft Hodular Survival System. Cargo/Handling Equipment: Conduct a validation In-Process Review (IPR) to initiate FSED and hardware acquisition for DT/OT II testing for the Internal Cargo/Handling System for the CH-47 helicopter. Initiate FSED and prototype fabri ation of the Container Helicopter External Lift System (CHELS) for the CH-47 helicopter.

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Program Element: \$6.42.04.A

DOD Mission Area: \$218 - Land Warfare Associated Air Hobility

Title: Air Mobility Support Equipment
Budget Activity: #4 - Tactical Programs

- 3. (U) FY 1983 Planned Program: Ground Support Equipment: Continue Full-Scale Engineering Development (FSED), design, fabrication and testing for the Aircraft Decontamination, Deicing, and Cleaning System (ADDCS); the Small Portable Amalyzer and Diagnostic Equipment (SPADE); and the Non-Divisional Aviation Intermediate Maintenance (AVIM) Tool/Shop complex. Aviation Life Support Equipment (ALSE): Continue DT/OT II listing of the Helicopter Oxygen System (HOS) and FSED of the On-Board Oxygen Generating System (OBOGS) for RV-1D/RU-21 Special Electronic Mission Aircraft (SEMA). Initiate FSED of the Aircraft Modular Survival System. Type classify the Helicopter Floatation Kit Army Standard. Cargo-Handling Equipment: Complete acquisition of the FSED hardware and conduct DT/OT II testing of the Internal Cargo Handling System for the CH-47 helicopter.
- 4. (U) FY 1984 Planned Program: Ground Support Equipment: Continue Full-Scale Engineering Development (FSED) for the Aircraft Decontaminating, Deicing, and Cleaning System (ADDCS) and the Small Portable Analyzer Diagnostic Equipment (SPADE). Initiate FSED, design, and fabrication of the Helicopter Battle Damage Repair (HBDR) program. Aviation Life Support Equipment: Continue FSED of the On-Board Oxygem Generating System (OBGGS) for the RV-ID/RU-21/UV-18 aircraft and ready the system for FY 1985 DT/OT II testing. The Inflatable Body and Head Restraint System (IBAHRS) is planned for transition from advanced development to FSED. The Naval Air Development Center plans to award an FSED contract for design and fabrication of the IBAHRS. Separate contract awards are planned by the US Army Aviation Research and Development Compand for system integration in the AH-IS and AH-64 aircraft. DT/OT II testing will continue on the aircraft Hodular Surval System. Initiation of FSED is also planned for the Integrated Aircraw Helmet System, a Personnel Locator System for aircrew, and Phase I of the Aviation Life Support System Integrated Battlefield (ALSSIB). Cargo-Handling Equipment: Complete development of the Internal Cargo Handling System and transition to CH-47 Project Management Office for inclusion in the fleet as a product improvement. Continue engineering development of the Container Helicopter External Lift System (CHELS) for the CH-47. Initiate FSED and hardware acquisition for the Low Visibility Advanced External Load Acquisition System for cargo and utility helicopters.
- 5. (U) Program to Completion: Due to the composite nature of this program element in supporting the full-scale engineering development of air mobility support equipment, it has been and will be a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.06.A

DOD Mission Area: #218 - Land Warfare
Associated Air Mobility

Title: BLACKHAWK

Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 7045	FY 1982 Estimate 6140	FY 1983 Estimate 6708	FY 1984 Estimate 13450	Additional to Completion 45359	Total Estimated Cost 79862
D069	UH-60 Feasibility Demonstration	7045	6140	5664	0	0	20009
D193	UH-60 MOD	0	0	1044	13450	45359	59853

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Congress directed this program to demonstrate the feasibility of firing the HELLFIRE missile from the UH-60 sircraft. The program also develops sircraft hard points and hardware to mount external stores such as the M-56 helicopter mine-dispensing system or an external fuel storage system to improve the self-deployability of the UH-60A BLACKHAWK. This program further provides for the Research and Development effort associated with the UH-60 block modification program which enhances and upgrades the BLACKHAWK mission capability by developing improved components such as composite rotor blades.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Funds are required to cover the fourth increment of contractual effort on the external stores system to include development tests, airworthiness evaluation, and the government development tests and operational test of the feasibility demonstration project. The first increment of the UH-60 block modification program will begin in FY 1983 with the investigation of engine upgrades and composite main rotor blades.

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Program Element: #6.42.06.A

DOD Mission Area: #218 - Land Warfare

Associated Air Mobility

Title: BLACKHAWK
Budget Activity: #4 - Tactical Programs

Hajor Hilestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Contract Award	February 1981	December 1980
Critical Design Review	3rd Qtr FY 1981	June 1981
lst Missile Firing	2nd Qtr FY 1982	2nd Qtr FY 1982
Demonstration Completion(OT)	4th Qtr FY 1983	lst Qtr FY 1983
Final Report	lst Qtr FY 1984	3rd Qtr FY 1983
Block Mod R&D Complete	3rd Otr FY 1987	Not Shown

The contract for the feasibility demonstration was awarded two months late due to the redefinition of the effort to include the Army requirements other than the HELLFIRE demonstration, and the critical design review was slipped. The demonstration completion date and final report date were extended due to the inclusion of an operational test of the External Stores Support System (ESSS) not previously scheduled. This will culminate the ESSS program by full qualification of the system.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements) Funds (as shown in FY 1982	7045	6140	6708	58809	79862
submission)	5046	6158	3110	0	498214

The increase in FY81 funding is the result of a slip in program spending which reduced FY80 requirements, thereby increasing the FY81 profile by the same amount. The FY82 differential is the result of inflation index changes. The FY83 increase and additional cost to completion are the result of the startup of D193, UH-60 modification program, Research and Development which runs from FY83-FY87, and a change in scope of the feasibility demonstration D069. The latter requirement was amended to include a four-station external fuel tank capability and a full-scale operational test. The change in the total reflects the dropping of project D378, BLACK HAWK, from this program element.

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Program Element: #6.42.06.A

DOD Mission Area: #218 - Land Warfare

Associated Air Mobility

Title: BLACKHAWK Budget Activity: #4 - Tactical Programs

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

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Program Element: #6.42.06.A

DOD Mission Area: #218 - Land Warfare

Associated Air Hobility

Title: BLACKHAWK
Budget Activity: #6 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program element contains two projects, the UH-60 Feasibility Demonstration and the UH-60 Modification program.
- 1. (U) The first project encompasses the design, development, test and full qualification of the External Stores Support System (ESSS), the feasibility demonstration of the HELLFIRE missile launch and M-56 mine-dispensing system, and the development of an external fuel system for extended range capability. Funds have been programed for the following efforts through program completion in FY 1983:
- a. (U) Relocate, design, and qualify fuselsge hard points and a removable external stores system for the UH-60A capable of carrying eight HELLPIRE missiles on each side of the UH-60A. The stores system will also be capable of carrying external fuel tanks and pine dispensers.
- b. (U) Conduct flight tests to qualify the ESSS with external fuel tanks and to evaluate compatibility of the system with missiles and launchers.
- c. (U) Fire ballistic missiles to insure RELLFIRE missile blast pressure is compatible with the UH-60A structure and conduct an airborne firing survey to determine airframe and missile compatibility with regard to both structural loads and stability of the airframe and missile.
- d. (U) Conduct a preliminary airworthiness evaluation and a developmental test by the US Army Test and Evaluation Command.
- 2. (U) The second project, the UH-60 Modification program, provides for preplanned product improvement through a block modification. The program will study the requirements, determine which improvements should be applied, and develop the necessary block modifications. Known improvements to be pursued include the engine upgrades, uprated transmissions, composite main rotor blades, two-hook suspension system, and digital avionics/multiplexing. The above improvements will provide the UH-60 with a melf-recovery capability and greatly increase the capabilities required in support of Rapid Deployment Force (RDF) missions.
- G. (U) RELATED ACTIVITES: The HELLFIRE missile is being developed under Program Element 6.43.10.A, Heliborne Missile-HELLFIRE.

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Program Element: #6.42.06.A

DOD Mission Area: #218 - Land Warfare

Associated Air Mobility

Title: BLACKHAWK

Budget Activity: #4 - Tactical Programs

H. (U) WORK PERFORMED BY: United Technologies Corporation, Sikorsky Aircraft Division, Stratford, CT; Rockwell International, Columbus, OH; BLACKHAWK Project Manager's Office, St. Louis, MO.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Initiated ground testing of hard points and external stores support system. Structural tests of the first flight articles were completed.
- 2. (U) FY 1982 Program: Handling qualities evaluation with missiles installed, firing of three bellistic missiles, test analysis, mine dispenser design verification testing, external stores system qualification flight testing, and preliminary sirworthiness evaluation by the Army Aviation Engineering Flight Activity (AEFA), Edwards AFB, CA.
- 3. (U) FY 1983 Planned Program: For the feasibility demonstration, completion of flight teating; design and qualification of fuel, pneumatic, and electrical systems for transfer of external fuel; government development testing and operational testing will be completed. For the UH-60 modification program: Begin investigation of engine upgrades and composite main sofor blades.
- 4. (U) FY 1984 Planned Program: Complete engineering on engine upgrade, begin design of the 3400 SHP transmission and two-hook suspension system, finish engineering design of composite main rotor blade, and begin qualification testing. Begin engineering design and development of digital avionics, doppler and map display, and investigation of full multiplexing capability.
- 5. (U) Program to Completion: Engineering development of the UH-60 block modification program is scheduled to be completed in FY 1987.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # D069

Program Element: # 6.42.06.A DOD Mission Area: #218 - Land Warfare Associated Air Mobility

Title: UH-60 Feasibility Demonstration

Title: BLACK HAWK

Budget Activity: #4 - Tectical Programs

- (U) DETAILED BACKGROUND AND DESCRIPTION: In reviewing the FY80 budget, Congress added \$3.0 million to Program Element 6.43.10 to demonstrate the feasibility of using the UH-60A as a firing platform for HELLPIRE missiles. In FY81, \$5.42 million was added to expand the scope of the effort. During development of a program to conduct the proposed demonstration and design an external structure from which the missiles could be launched, the Army established a requirement for design and qualification of an External Stores Support System which would carry external stores such as the missiles, external fuel tanks, and mine dispensers. An additional requirement to be able to self-deploy the UH-60A up to 1150 nautical miles employing external auxiliary fuel tanks has been incorporated into the program. Definition of the total program caused some delay in initiation; however, the feasibility demonstration is scheduled to be conducted within 60 days of first flight to minimize the impact on the original program. Overall objectives of the program are to:
- 1. (U) Relocate, design, and test hard points and an external stores support system on the UH-60A suitable for carrying 8 HELLFIRE missiles on each side and other stores such as fuel systems and mine dispensers.
- 2. (U) Conduct flight tests to insure serodynamic and structural compatibility of the system and HELLFIRE launchers with the UH-60A.
- 3. (U) Fire ballistic missiles to insure HELLFIRE missile blast pressure is compatible with the UH-60A structure and conduct a firing survey to assess airframe and missile compatibility with regard to atructural loads and missile dynamics. Report the results.
 - 4. (U) Conduct a flight test program to qualify the External Stores Support System with external fuel tanks.
- 5. (U) Conduct a preliminary airworthiness evaluation, a developmental test and an operational test to evaluate the operational suitability of the system.
- B. (U) RELATED ACTIVITIES: FY80 and FY81 funds for the UH-60 feasibility demonstration were shown under Program Element 6.43.10.A, Heliborne Missile HELLFIRE. With the expansion of the project to include the increased external stores capability, the project was moved under the BLACK HAWK program element.

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Project: # D069

Program Element: # 6.42.06.A
DOD Mission Area: #218 - Land Warfare Associated Air Mobility

Title: UH-60 Feasibility Demonstration

Title: BLACK HAWK

Budget Activity: #4 - Tactical Programs

C. (U) WORK PERFORMED BY: Sikorsky Aircraft Division, Stratford, CT, for airframe design and modification; Rockwell International, Columbus, OH, for missile integration. Program Manager, BLACK HAWK, will have Army responsibility for program execution.

- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: Initiated design, fabrication, and ground testing of hard points and external stores support system. Conducted structural tests of the first flight article.
 - 2. (U) FY 1982 Program: Conduct HELLFIRE feasibility demonstration and initiate sirworthiness qualification.
- 3. (U) FY 1983 Planned Program: Conclude Contractor Developmental Tests, complete Preliminary Airworthiness Evaluation, Covernment Development Tests and Operational Tests.
 - 4. (U) FY 1984 Planned Program: Program terminates in FY 1983.
 - 5. (U) Program to Completion: N/A.

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Project: # D069
Program Element: # 6.42.06.A
D0D Mission Area: #218 - Land Warfare Associated
Air Mobility

Title: UH-60 Feasibility Demonstration
Title: BLACK HAWK
Budget Activity: #4 - Tactical Programs

6. (U) Major Milestones:

	Current	Milestone Dates			
Major Milestones	Milestone Dates	Shown in FY 1982 Submission			
Critical Design Review	3rd Qtr FY 81	June 1981			
let Flight	2nd Qtr FY 82	None			
lst Missile Firing	2nd Qtr FY 82	2nd Qtr FY 82			
Contractor Flight Testing	2nd Qtr FY 83	None			
Complete	•				
Feasibility Demonstration	4th Qtr FY 83	1st Qtr FY 83			

The critical design review was slipped due to the increase in scope of the program to include Army requirements other than the HELLFIRE demonstration. The program completion date was delayed due to incorporation of an operational test into the program.

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Project: # D069
Program Element: # 6.42.06.A
DOD Mission Area: #218 - Land Warfare Associated
Air Mobility

Title: UH-60 Feasibility Demonstration
Title: BLACK HAWK
Budget Activity: #4 - Tactical Programs

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

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	7045	6140	5664	0	0	20009
Funds (as shown in FY 1982 submission)	5046	6158	3110	0	0	17314
Quantities (current requirements)	400					
Quantities (as shown in FY 1982 submission)	400					

The increase in FY 1981 actual expenditures is due to the plus-up that made up for the reduction in the FY 1980 program. The decrease in FY 1982 is a result of the use of revised inflation indices. The FY 1983 differential is the result of a change in scope to develop the four external tank capability and include a full operational test of the system-

Other Appropriations: Not Applicable.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.07.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Attack helicopter
Budget Activity: \$4 - Tactical Program

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Ratimated Cost
	TOTAL FOR PROGRAM ELEMENT	172941	91874	33725	39448	127274	1339637
D425	Advanced Attack Helicopter	172941	91874	33725	26823	29245	1230983
D423	AAH Modicications	0	٥	0	10625	98029	108654

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army needs the AH-64 APACHE to provide a significantly improved tank-killing capability relative to the AH-1 attack helicopter. In recognition of the apphistication and lethality of the air defense threat and improvements in the ballistic protection of numerically superior Warsaw Pact senor, a more survivable, versatile, and lethal attack helicopter is required to maintain a favorable combat exchange ratio. The AH-64 has been designed to provide these advantages. Emphasis has been placed on the design and development of a weapons system with superior flight performance; an armament capability to defeat ; and a mission equipment package to allow day, night, and adverse weather operation, high survivability, and unequalled versatility. As important as the AH-64 is in defeating Warsaw Pact forces, it is an absolute must for providing a mobile, antisrmor capability to US forces that may be deployed to high-temperature, high-altitude areas such as Southwest Asia. It is the essential antisrmor support for the more lightly equipped forces that would most likely be deployed to these areas first. Aircraft armement includes the HELLFIRE Modular Missile System, 30mm chain gun, and 2.75-inch rockets. The AH-64 will be the Army's primary attack helicopter and will be complemented by the AH-1 series attack helicopters. The APACHE is entering production in FY 1982.

Program Element: #6.42.07.A DOD Mission Area: #212 - Indirect Fire Support Title: Advanced Attack Helicopter
Budget Activity: #4 - Tactical Program

C. (U) BASIS FOR FY 1983 RDTE REQUEST: Provides funds to complete residual producibility engineering planning, for development and qualification of test program sets (previously funded in procurement) for automatic test equipment, and for qualification of a composite main rotor blade.

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1982 Submission
Award Aerial Vehicle Development		
Contract (Phase 1)	June 1973	June 1973
First Flight	September 1975	September 1975
Complete Air Vehicles Fly-Off	September 1976	September 1976
Award Full-Scale "ngineering		•
Development Concract (Phase 2)	December 1976	December 1976
Award Competitive larget Acquisition		
Designation Systems		
and Pilot Night Vision Systems		
(TADS/PNVS) Contracts	March 1977	March 1977
Competitive TADS/PNVS Selection	April 1980	April 1980
Complete OT II	August 1981	August 1981
Production Contract Award	March 1982	December 1981
First Production Delivery	February 1984	November 1983
Initial Operational Capability (10C)	FY 1985	January 1985

The Army completed an Army Systems Acquisition Review Council (ASARC III) in November 1981 and decided that he AH-64 is ready to enter production in FY 1982. Contract negotiations will not be completed until February 1982, and the contract sward for full production is planned for March 1982 with first production delivery now scheduled for February 1984. The Defense Systems Acquisition Review Council (DSARC III) for production approval will be conducted in February 1982. A revision in Army procedures in Headquarters, Department of the Army, Letter 310-81, 31 August 1981, requires IOC to be projected to a fiscal year.

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Program Element: #6.42.07.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Attack Helicopter
Budget Activity: #4 - Tactical Program

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	172941	91874	33725	166722	1339637
Funds (as shown in FY 1982 submission)	172941	92162	0	0	1141385

The funding level difference in 1982 is attributable to the adjustment of fuel, inflation, and civilian pay pricing. The increase of funds in 1983 includes a transfer of funds from procurement to RDTE to complete development and testing of test program sets for automatic test equipment and the qualification of a composite main rotor blade. The Additional to Completion encompasses funds transferred from procurement to RDTE to develop depot test program sets and the initiation of a preplanned product improvement program (Project Number D423) in 1984 to incorporate emerging technologies to enhance survivability, reliability, availability, and maintainability as appropriate.

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Program Element: #6.42.07.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Attack Helicopter

Budget Activity: #4 - Tactical Program

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Aircraft Procurement, Army						
Funds (current requirements)	58800	544000	965000	1440600	3141500	6149900
Funds (as shown in FY 1982						
submission)	50800	365500	554100	Not Shown	44869 00	5457300
Quantities (current requirements) Quantities (as shown in FY 1982	0	11	48	96	291	446
submission)	0	8	44	Not Shown	414	536

The funding difference in FY 1981 is \$8000 thousand for initial spares as approved in FY 1981 Supplemental Budget. The funding difference of \$178500 thousand in FY 1982 includes an increase of \$98600 thousand to adjust the procurement quantity from 8 (Carter Budget) to 14 (Reagan Budget) and to increase the advance procurement for FY 1983 as approved in FY 1982 Amended Budget, an increase of \$39000 thousand to compensate for actual inflation versus projections, an increase of \$131400 thousand identified in November 1981 Army cost estimate for 14 AR-648, and a decrease of \$97500 thousand when the procurement quantity was reduced to 11 AR-648 and an increase of \$7000 thousand for application of January 1982 inflation indices. The funding difference of \$410900 thousand in FY 1983 includes an increase of \$238000 thousand to adjust the procurement quantity from 44 (Carter Budget) to 78 (Reagan Budget) and to increase the advance procurement for FY 1984, an increase of \$69300 thousand for growth in engine costs and inclusion of -701 engine in configuration, an increase of \$58600 thousand to compensate for actual inflation versus projection, an increase of \$197100 thousand identified in November 1981 Army cost estimate for 78 AR-648, a decrease of \$175500 thousand when the procurement quantity was reduced to 48 AR-648 and an increase of \$23400 thousand for application of January 1982 inflation indices. The funding difference of \$692600 thousand in the "Total Estimated Cost" column includes a decrease of \$413100 thousand for application of March 1981 inflation indices, a decrease of \$346300 thousand for growth in engine costs and inclusion of -701 engine in configuration, an increase of \$380900 thousand to compensate for actual inflation versus projection, an increase of \$1282200 thousand identified in

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Program Element: #6.42.07.A

DOD Mission Ares: #212 - Indirect Fire Support

Title: Advanced Attack Helicopter
Budget Activity: 44 - Tactical Program

- November 1981 Army cost estimate for 536 AH-64s, a decrease of \$624300 thousand when the procurement quantity was reduced to 446 AH-64s in the November 1981 Army Systems Acquisition Review Council III, and an increase of \$290400 thousand for application of January 1982 inflation indices.

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Program Element: #6.42.07.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Advanced Attack Helicopter
Budget Activity: #4 - Tactical Program

F. (U) DETAILED BACKGROUND AND DESCRIPTION: In September 1972, the US Army approved an Advanced Attack Helicopter (AAH) development program for an attack helicopter with greater agility, better performance, and a greater serial fire support capability than currently available in existing Army serial weapons systems. The AAH program was presented to the Defense Systems Acquisition Review Council (DSARC 1), and on 10 November 1972, the Deputy Secretary of Defense authorized release of the AAH Request for Proposals (RFP). This specified a \$1.4M to \$1.6M (FY72 constant dollars) contraint on the recurring flyaway design-to-unit production cost, based upon an initial production buy of 472 aircraft. In April 1976, the planned procurement quantity was increased to 536 aircraft. The RFP stressed acquisition and operational costs as prime considerations in the program and in the competitive selection between contractors. Five helicopter manufacturers, Bell, Sikorsky, Boeing-Vertol, Hughes, and Lockheed responded to the RFP. As a result of the HELLFIRE DSARC on 26 February 1976, it was decided that the HELLFIRE missile would be utilized as the point target weapon for the AAH in lieu of the initially proposed Tube-launched, Optically Tracked, Wire-Guided (TOW) Missile System. On 23 March 1976, the DSARC directed that the Target Acquisition Designation Sight (TADS) and the Pilot Night Vision Sensor (PNVS) be competitively developed and a flyoff conducted between the competitors. Development of the AAH consisted of two phases. The first phase was conducted as a flyoff of two AAH prototypes each from the competing contractors, Bell Helicopter Textron and Hughes Helicopters, to insure airframe acceptability in the critical area of flight handling qualities and performance. Competitive development contracts for Phase I were awarded to Bell Helicopter Textron and to Hughes Helicopters. Government testing (flyoff) was completed on 30 September 1976. The AAH DSARC 11, held on 7 December 1977, resulted in approval of the AAH to enter full-scale engineering development (Phase 2). On 10 December 1976 the Secretary of the Army selected Hughes Helicopters (YAH-64) as the prime aircraft system contractor for Phase 2. Phase 2 consisted of modification of the two Hughes Helicopters' Phase 1 aircraft, fibrication of three additional air vehicles, subsystems development, and integration and testing of the total weapons system. Of particular importance to the AAH program was the competitive development of TADS/PNVS by Martin Marietta and Northrop Corporation. Martin Marietta was selected as the winning contractor in April 1980. At the direction of the Office of the Secretary of Defense, the use of the WECOM-30 ammunition for the 30mm gun on the YAH-64 was obviated in favor of development of an ADEN/DEFA (British and French gun) compatible round to provide interchangeability and interoperability with NATO and other US 30mm guns. The AAH program manager has development responsibility for this ammunition. A project manager for the TADS/PNVS and a product manager for the 30mm ammunition have been designated to assist the Advanced Attack Helicopter program manager in the development of the AAH system. During June-August 1981 the Army completed a successful Operational Test II for the AH-64, and the results are described in the Test and Evaluation Section. In November 1981, the Army Systems Acquisition Review Council (ASARC) III determined that the AH-64 is ready to enter production in FY 1982 and type classified the system as Standard.

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- G. (U) <u>RELATED ACTIVITIES</u>: The Army AH-IS Cobra/TOW, Program Element (PE) 6.42.12.A, and the Marine Corps AH-IT are related helicopters. The AH-IS provides the Army a current aerial antitank capability with the TOW missile until the availability of the higher performance AAH, and is planned as a complement to the AAH in a high-low mix. The AH-IS, and AH-IT lack performance, adverse weather mission capability, firepower, night vision devices, and survivability characteristics required of the attack helicopter and available in the AH-64. The General Electric T700 engine installed in the YAH-64 is being managed by the BLACK HAWK project manager (PE 6.42.06.A). The heliborne missile HELLFIRE is being developed under PE 6.43.10.A. The 30mm ADEN/DEFA ammunition is being developed under PE 6.42.02.A, Aircraft Weapons. These related activities are all carefully coordinated to preclude duplication of effort and insure system and delivery compatibility.
- H. (U) WORK PERFORMED BY: Hughes Helicopters, Culver City, CA, is the airframe and 30mm ammunition developer and is responsible for the total weapon system integration in Phase 2. General Electric Company, Lynn, MA, is the manufacturer of the government-furnished T700 engine. Martin Marietta, Orlando, Fl, is the contractor for the Target Acquisition Designation Sight (TADS) and the Pilot Night Vision Sensor (PNVS). The Advanced Attack Helicopter (AAH) program manager's office, located at the US Army Aviation Research and Development Command, St Louis, MO, is responsible for the development program. Major subcontractors include Advanced Structures Division, Montrovia, CA; Aircraft Gear Corporation, Chicago, IL; Bendix, Utica, NY; Bertea, Irvine, CA; Garrett Airesearch, Phoenix, AZ, and Torrance, CA; General Electric, Lynn, MA; Honeywell, Minneapolis, MN; Kearfott, Little Fall, NJ; Litton Guidance and Control Systems, Woodland Hills, CA; Litton Precision Gear, Chicago, IL; Lockheed Aircraft Service Company, Ontario, CA; Menasco, Burbank, CA; RCA Automated Systems, Burlington, MA; Rockwell International, Columbus, OH; Sperry, Phoenix, AZ; Teledyne Ryan Aeronautical, San Diego, CA; Teledyne Systems Company, Northridge, CA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Competitive contracts for Phase I development were awarded to Bell Helicopter Textron and Hughes Helicopters on 22 June 1973. Phase I development concentrated on aerial vehicle development. Phase 2 included subsystems development and integration into the total weapons system. Throughout FY 1974 and 1975 and until the latter part of FY 1976, each of the contractors designed, fabricated, and tested a ground test vehicle (GTV) and two prototype air vehicles. On 30 September and 1 October 1975, respectively, Hughes Helicopters and Bell Helicopter Textron made first flights with their prototypes and began the contractor flight test programs. On 31 May 1976, each contractor delivered two flyable prototype aircraft to the government for flight training, testing, and evaluation. Flight testing was completed successfully on 30 September 1976. Source selection activities, which began in July 1976 when the

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Army received Phase 2 proposals from each of the contractors, were completed with the selection of Hughes Helicopters as the winning contractor. A contract award for full-scale engineering development was made on 10 December 1976. Target Acquisition Designation Sight (TADS) and Pilot Night Vision Sensor (PNVS) proposals from industry were received by the Army in November 1976, and TADS/PNVS contracts were awarded to Martin Marietta and Northrop Corporation on 10 March 1977. During Fy 1977, Hughes Helicopters initiated engineering design efforts to incorporate configuration changes identified by the Phase I Source Selection Evaluation Board. Testing was also initiated on the GTV and air vehicles to support the Phase 2 prototype modification effort. Due to restructuring of the original FY 1978 budget request, fabrication of the additional three prototypes was delayed from FY 1977 until FY 1978. During FY 1978, design, fabrication, and assembly of the three additional prototype aircraft were initiated. In FY 1979, prototype TADS/PNVS system were integrated with the AAH fire control system. Pilot flight training was initiated to support flight testing for the Armament and Fire Control Survey and in preparation for the TADS/PNVS flyoff scheduled for early 1980. In July 1979, the AAH development program was restructured internally to consolidate all remaining operational testing (OT) at the end and to provide additional time to correct technical problems. In this restructuring, the production contract award was delayed one year, which also accommodated the increasing production leadtimes. In April 1980, Martin Marietta was selected as the contractor for the maturity phase of the TADS and PNVS program which includes finalization of the design, qualification testing, and support of the Advanced Attack Helicopter (AAH) flight tests. Flight tests of the new stabilator design demonstrated that the previous flight han dling and loads problems were eliminated, and complete expansion of the aerodynamic flight envelope was accomplished. Integration and testing of the weapons systems, TADS/PNVS, and fire control system on the AAH were highly successful. During FY 1981 contractor and government flight testing continued on all four vehicles with emphasis on reliability, svailability, and maintainability (RAM) culminating in a user assessment during OT II in June through August 1981. Long-lead-time-item (LLTI) contracts were awarded in February 1981 in preparation for the production contract in FY 1982.

2. (1) FY 1982 Program: Contract awards for the production phase are planned for Martin Marietta, Hughes Helicopter, and General Electric in March 1982 following the Defense Systems Acquisition Review Council (DSARC) III in February. Development and test efforts will include development of support and test equipment for maintenance tasks, diagnostic programs for mission equipment, and test program sets for automatic test equipment. Flight tests will be conducted with the -701 engine for the production configuration. The Army will also conduct tests in the Eglin AFB climatic hangar, an icing survey in Minnesota, and perform flight tests to provide dats for Army crew manuals.

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- 3. (U) FY 1983 Planned Program: Development and qualification of test program sets for automatic test equipment will continue to support fielding the AH-64. A composite main rotor blade will be flight tested and qualified for installation in the FY 1984 production aircraft.
- 4. (U) FY 1984 Planned Program: Development and qualification of test program sets will continue. A preplanned product improvement program will be initiated, as appropriate, to enhance the capabilities of the AH-64 with emerging technologies. Efforts in consideration include enhancements for reliability, availability, and maintainability and complementary navigation and target acquisition capabilities such as a radar frequency interferometer, automatic target recognizer, and automatic target handoff system. Initial production deliveries of AH-64s to the training base will begin.
- 5. (U) Program to Completion: Qualification of test program sets will be completed, and preplanned product improvements will continue as appropriate. A force development test and evaluation will be conducted in PY 1985 by the first company to receive production AH-64 helicopters.

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J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

- a. (U) The AAH development program has been divided into two phases. Phase 1 was competitive development of the basic aircraft with very limited weapons integration. Phase 2 encompasses the integration of all weapons subsystems into the winning Phase 1 aircraft together with the fabrication and test of 3 new prototype aircraft built to approximate production configuration. Within the Phase 2 effort was a competitive development and selection of the Target Acquisition Designation Sight (TADS) and Pilot's Night Vision Sensor (PNVS). Phase 2 will be completed in 1982 and followed by development and testing of the remainder of the test program sets for sutomatic test equipment and potential enhancements for mission capability such as composite components and mast-mounted devices. Both independent and joint developmental tests are conducted by contractor and government test personnel. Significant past developmental program events are as follows:
- (1) (U) Competing Advanced Attack Helicopter (AAH) contractors, Bell Helicopter Textron and Hughes Helicopters, successfully completed Phase 1 testing on 30 September 1976. Phase 1 testing included contractor design support tests, testing of individual components to verify structural integrity and establish fatigue life, and bench testing of dynamic components. Complete dynamic system testing using the Ground Test Vehicle (GTV) began in April 1975. Following successful completion of GTV qualification testing, first flights occurred on 30 September and 1 October 1975 for Hughes and Bell, respectively. Each contractor completed more than 300 hours of flight testing prior to delivery of two flight vehicles each to the Army on 31 May 1976. The primary objective of this contractor testing was flight envelope development, demonstration of structural integrity, and evaluation and verification of sircraft flight handling qualities. The 30mm cannon and 2.75-inch rocket subsystems underwent limited in-flight firing tests also.
- (2) (U) The Army Engineering Flight Activity (ARFA) at Edwards Air Force Base, California, conducted Development Test (DT) I during July-September 1976 to evaluate flight handling qualities and circraft performance including in-flight firing of the 30mm cannon and 2.75-inch rocket subsystems. Reliability, availability, and maintainability (RAM) data were obtained throughout the test program. The Army selected the Hughes YAH-64 to enter Engineering Development (Phase 2), and a contract was awarded on 10 December 1976.

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- b. (U) During Phase I government competitive tests (GCT), which combined developmental and operational testing on the YAH-64, the major deficiencies identified included controllability problems in sideward flight, an unreliable swilliary power unit and engine starting system, and structural inadequacy of the cooling fan associated with the infrared suppression system. Design changes have been made in Phase 2 as discussed below.
- (1) (U) Phase 2 development tests (DT) made maximum use of contractor/government integrated tests to eliminate duplication. Initial contractor DT in Phase 2 has further expanded the sircraft flight envelope and evaluated modifications that have been proposed to the Phase 1 design. The first set of modifications (MOD 1) incorporated a changed empennage, improved automatic stabilization equipment and a new infrared suppressor and removed the unreliable cooling fan. Findings from the government Engineering Design Test (EDT-1), conducted in May 1978 to evaluate the MOD 1 changes, indicated improved sideward flight characteristics, improved handling qualities (particularly in the areas of static longitudinal stability, pitch-to-side-slip coupling and control breakout forces), and much improved reliability, availability, and maintainability (RAM) with the removal of the unreliable cooling fan. The most significant deficiencies discovered during this test include: less than desirable main-rotor-to-canopy clearance; undesirable handling characteristics with Sambility Augmentation System (SAS) off in left sideward flight and at speeds above 120 knots true airapeed; vibrations at the crew station in excess of specification requirements; and canopy drumming caused by a combination of aircraft vibration and main rotor passage. Subsequent to EDT-1, a second set of modifications (MOD 2) was installed on the Phase 1 prototypes. These modifications included incorporation of the suit of weapons subsystems (e.g., Target Acquisition Designation Sight (TADS), Pilot Night Vision Sensor (PMVS), and HELLFIRE missile) and sirframe-related changes to include a new auxiliary power unit.
- (2) (U) During the MOD 2 period, the government conducted an evaluation to confirm the correction of deficiencies in the airframe. This test, EDT-2, occurred in April 1979. Only one major new deficiency was revealed; this was insufficient left pedal during right sideward flight at most critical wind azimuth and high velocity. Although the main rotor mast was raised prior to this test, canopy vibrations remained unsatisfactory. Sideward flight characteristics with SAS off also remained unsatisfactory. These results indicated that the design of the empennage, primarily in the fixed horizontal stabilizer area, was deficient. As a result of these findings, a basic redesign was undertaken to incorporate a movable stabilizer (stabilator). The deficiencies did not, however, preclude continued subsystems development and integration. The systems-configured Phase I aircraft arrived at the weapon test facility at Yuma Proving Ground, AZ, in June 1979. The first flight of a prototype helicopter with the redesigned stabilator was on 31 October 1979, and all five prototypes had received the modification by May 1980. Flight test data indicates that the stabilator has corrected the technical problems it was designed to correct.
 - c. (U) Prototypes used during Phase 2 include both early developmental sircraft from Phase 1 and the three new UNCLASSIFIED

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Phase 2 aircraft. The Phase 1 aircraft had a series of modifications so as to generally conform to the final specification. The new Phase 2 aircraft are the production configuration, and producibility engineering has been implemented for them. Wo known changes are contemplated in the total system which would invalidate the developmental effort to date or affect the procurement of long-lead items.

- d. (U) Early in 1980, the total system aircraft entered the final period of test and evaluation. Prior to this time, the four systems prototypes were in several unique configurations primarily determined by the stabilizer configuration and the TADS/PNVS type. As of early May 1980 all systems aircraft were in a conforming configuration. The Army conducted Engineering Design Test 4 during 10-29 November 1980 with approximately 33 flight hours. The objectives of sassesing corrections to previously revealed discrepancies, confirming satisfactory flight handling characteristics, and checking aircraft performance were accomplished. One new deficiency was reported relating to erroneous activation of one of the audio warning tones associated with a generator failure. The previously revealed deficiencies from EDT 1 and 2 had been corrected. Subsequent to this Army evaluation, changes were made to the OT II aircraft to correct the new deficiency. EDT 4 was followed by EDT 5 during December 1980-January 1981 with 28 flight hours. The objectives were to assess readiness of the aircraft and subsystems for entry into OT II and to determine any safety-related problems. Two deficiencies were reported: The first was due to an inoperative fuel transfer system (maintenance problem); the second was due to an unreliable on-board auxiliary power unit (related to installation discrepancies). A number of shortcomings was also reported. Embeddent to these test periods, each of the discrepancies reported from EDT 4 and 5 was examined for implementation of co. rective action prior to OT II. This resulted in changes in hardware/software or operating techniques. Correction of all reported deficiencies was confirmed and validated by Army representatives prior to OT II. In addition, correction of the majority of the shortcomings was also accomplished and verified. Those discrepancies, which, because of hardware/software leadine, could not be ready for OT II, were documented and reviewed as changes for incorporation in the production AR-64 co
 - e. (U) In accordance with the AAH development contract the following T&E assignments are operative:
 - (1) (U) Development Contractor:
 - (a) (U) Prototype Aircraft Hughes Helicopters, Culver City, CA
 - (b) (U) TADS/PNVS Martin Marietta Co, Orlando, FL
 - (c) (U) 30mm Ammo Hughes Helicopters

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- (d) (U) HELLFIRE Missile Rockwell International Corporation, Columbus, OH
- (2) (U) Test support is provided by Army development and readiness commands with contract consultative services to be obtained as required.
- (3) (U) Service Program Hanager: MG E. M. Browne, Program Manager -- AAH, US Army Materiel Development and Readiness Command.
 - (4) (U) Development Test and Evaluation:
 - (a) (U) US Army Test & Evaluation Command (USATECOM) Yums Proving Ground, AZ, and Electronics Proving Ground, AZ
 - (b) (U) US Army Aviation Research and Development Command (USAAVRADCOM), St Louis, NO
 - (c) (U) Ballistic Research Laboratory (BRL), Aberdeen Proving Ground, MD
 - (d) (U) US Army Aeromedical Research Laboratories (USAARL), Ft Rucker, AL
- (e) (U) US Army Communications and Electronics Research Command (USACERCOM), Night Vision Laboratories (NVL), Ft Monmouth, NJ
 - (f) (U) US Army Materiel Systems Analysis Activity (USAMSAA), Aberdeen Proving Ground, MD
 - f. (U) Major test areas and agencies involved are as follows:
- (1) (U) Air Vehicle Tests DT: Contractor primary test base is Carlsbad, CA (Palomar Airport). Adjacent USHC Camp Pendleton was used to fire the various weapons in a restricted mode. Government air vehicle tests were also conducted at this facility for short periods, but the major government tests are conducted at Edwards AFB, CA.
- (2) (U) Systems Tests DT: The major site for both contractor and government systems tests is USA Yuma Proving Ground (YPG), AZ. Relatively short tests, to examine unique system characteristics, are accomplished away from YPG (e.g., natural icing tests in northern Minnesota).

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Budget Activity: #4 - Tactical Program

- g. (U) Future major test schedule: Force Development Test and Evaluation in 1985.
- h. (U) As previously stated, 5 flying prototypes have been in the test program. In November 1980 the nonsystematized structural flight test helicopter was involved in a midair collision. The accident was fatal for the crew and the sircraft was lost to the program. Adjustments to schedules and priority of development efforts were made which resulted in an approved program that accomplished all critical actions prior to the production decision.
- 1. (U) A total of 63 HELLFIRE guided missile firings is in the AAH test programs. Firings through December 1981 have achieved a hit percentage of 88 percent. These firings contributed to the development of this missile which is being conducted by a separate project manager at US Army Missile Command.
- 1. (U) Reliability, availability, and maintainability (RAM). RAM data collected during testing and specific RAM objectives are listed in paragraph 2f.
- k. (U) The total system is designed to meet the requirements for worldwide operations. In furtherance of these requirements, and in addition to individual component laboratory environmental tests, the total system will undergo tests in natural desert environment (YPG), cold environments (Minnesota), temperate environments (California) and simulated environments of a climatic hangar. Environmental conditions such as vibration, shock, fatigue, and temperature are also an inherent part of the developmental effort.

2. (U) Operational Test and Evaluation:

(U) Operational Test (OT) I was conducted in September 1276 at Edwards Air Force Base, CA, by the US Army Operational Test and Evaluation Agency (OTEA) in conjunction with Development Test (DT) 1. Approximately 16 hours were flown on each contractor's design during this test utilizing representative attack helicopter mission profiles. Aircraft flight and detectability characteristics and mission performance in a low-level and map of the earth (NOE) operational environment were emphasized. Military crews for the competitive flight tests consisted of an Army Engineering Flight Activity (AEFA) test pilot as pilot, and an experienced attack helicopter pilot from a US Army Forces Command (FORSCOM) unit as copilot/gumner. Operational Army maintenance personnel observed all maintenance activities. The current Army attack helicopter (AH-13) was concurrently flown on all YAH-64 missions to establish comparative baseline data. The full weapons, electro-optical, and navigational subsystems were not tested during OT I. OTEA prepared an independent evaluation of OT I which was briefed to the Army Systems Acquisition Review Council in December 1976. OTEA concluded that the Advanced Attack Helicopter (AAH) was suitable for continuation into the next phase. The major discrepancies identified were those

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associated with the auxiliary power unit and starting system. These were previously discussed in the Development Test

- b. (U) USACTEA conducted the YAH-64 Operational Test 11 (OT 11) during June-August 1981 at Fort Hunter-Liggett, CA, using three aircraft in three major test segments: force-on-force with free play and near-real time casualty assessment; live fire with HELLFIRE, 30mm, and 2.75-inch rocket subsystems, and side experiments. The specific objectives of this test were to assess operational effectiveness in a realistic operational environment; partially assess the operational reliability, availability, maintainability, and supportability; assess survivability in an operational environment; obtain information on deployment; obtain information on the adequacy of the proposed training programs for operator and maintenance personnel; and to obtain data to determine the correction of discrepancies discovered during DT/OT I. This test started in June 1981 following several months of training for all maintenance personnel and five months of flight training for the YAH-64 sircrews. All Army player personnel used in this test represented comparable slices of Army TOE attack helicopter and aviation maintenance units.
- c. (U) Although the test data are still being analyzed and evaluated, the following initial test results are available:
- (1) (U) Mission Performance: The capability of the AH-64 to detect, recognize, engage, and destroy armor and air defense targets during daylight, clear scenarios is superior to that exhibited by the baseline AH-1S (modernized COBRA). The AH-64 adds two capabilities to the Army by its ability to fight at night and conduct indirect engagements of threat targets. The AH-64 mission performance is adequate for combat.
- (2) (U) Survivability: The AH-64's demonstrated survivability against threat weapon systems is superior to the baseline AH-1S (modernized COBRA) in terms of smaller number of losses per battle and reduced opportunities for the threat weapon system to engage the helicopter. The AH-64 survivability is adequate for combat.
 - (3) (U) Operational Reliability, Availability, and Maintainability (RAM):
- (a) (U) Mission reliability of the AM-64 met the DCP goal of 17.0 hours, mean time between failure, and is adequate for fielding. The reliability of the TADS is marginal, with difficulties encountered in maintaining boresight (corrected prior to live fire); divergent laser spot and low power output noted intermittently during testing; poor shutter control resulting in occasional damage to the laser range receiver; and intermittent ranging from the fire control computer resulting in incorrect missile time of flight. The boresight shift was isolated to the TV camera and FLIR camera in the UNCLASSIFIED

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TADS. These cameras had been redesigned for producibility in the maturity-phase TADS. The corrective action is to modify the cameras to the previous trouble-free configuration and build two modified cameras for tests to be completed in April 1982. The divergent laser spot and low power output result from the laser transceiver unit (LTU) overheating. This problem has been solved in the production design laser now undergoing qualification testing. The Army has improved the cooling pump, eliminated contamination, and reduced the heat generated by the flash lamp. The shutter problem on the laser was noted prior to OT II, and corrective action was initiated. However, time did not allow the laser transceiver units that were installed at the beginning of OT II to be modified. LTU number 10 has the modification of the rotary solenoid shutter and was used at the end of OT II and at Yuma Proving Ground with no range receiver damage. The erratic ranging has been investigated by a technical team. Two logic problems existed between the LTU, TADS computer and the fire control computer. These logic problems have been corrected and verification is ongoing at Yuma Proving Grounds. A temperature sensitivity was also discovered in the range receiver electronics which causes noisy range output at high temperatures. The range receiver design is being corrected. The reliability of the 30mm Chain Gun was considered marginal because insufficient data were obtained during OT II to assess a probability. Since the end of OT II, 5921 rounds have been fired with four feed system stoppages and three gun stoppages. Cumulative firings (30,936 rounds) have now resulted in a 0.83 probability of firing a 320-round mission load against a mission criterion of 0.92. Five hundred rounds remain to be fired during the current Armament and Fire Control Demonstration. In addition, the 30mm reliability firing test is scheduled to begin during the latter part of December 1981. During this test 7000 rounds will be fired from the air and 10,000 from a ground stand. Virtually all design changes identified during previous testing will be incorporated into this hardware. This exercise will end during January 1982. Cumulative post-OT II rounds fired by this time will total approximately 24,000 and will provide sufficient data to assess the 30mm area weapon sybsystem design changes to increase reliability to 0.92.

- (b) (U) The overall availability of the AH-64 met the MENS goal of .75, using data from the most representative production configuration helicoter (AVO6), and is edquate for fielding.
- (c) (U) Maintainability of the AH-64 is considered marginal. Although the maintenance man-hours/flight-hours observed during OT were 4.68 hours against a criterion of not more than 14.4 hours, the mean-time-to-repair (MTTR) was 1.69 hours as compared to a criterion nor to exceed 0.9 hours. Maintainability was hindered by the immature automatic test equipment (ATE), maintenance manuals, and training available for the preproduction helicopters used during (" II. These items will mature as the Army prepares for fielding the AH-64 and MTTR will improve.
- (4) (U) Transportability/Deployability: The AH-64 has been certified for transport on the Ci4lB as a result of DT. A 406-nautical-mile cross-country flight during the OT II demonstrated the capability of the AH-64 to conduct long-range self-deployability missions.

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- d. (U) Due to the nonproduction configuration of several electrical components on board the test aircraft, a number of software test program sets (TPS) for the automatic test equipment (ATE) were waived for OT II. Follow-on evaluation (FOE) by the appropriate test agency of these waived TPS is planned for 1984-85.
- e. (U) Twelve HELLFIRE missiles were launched from the AH-64 during this test. The missiles were fired under simulated battlefield conditions using all launch modes, day and night. Moving targets, consisting of remotely controlled target vehicles, were used. Of the 12 missiles launched, I was a no-test; 10 of the remaining II accurately tracked the laser spot, and 8 hit the target.
- f. (U) The reliability, availability, and maintainability (RAM) assessment at OT II was based on data available from OT II and other data accumulated during Phase 2 testing. Army ground support personnel performed all support functions. Army maintenance personnel performed unit and intermediate maintenance support on all systems and subsystems unaided approximately 51 percent of the time, required contractor assistance approximately 32 percent of the time and passed the maintenance task to the contractor approximately 17 percent of the time. Proper ground support, including woat automatic test equipment, was utilized for the test. Operational realism was emphasized. An Army RAM data collection teem gathered data throughout the test for determination of AAH reliability and maintainability characteristics. The RAM objectives and OT II results, in terms of maintenance man-hours per flight hour (MMM/FH) and mean times between failures (MTBF), which were assessed at OT II, are listed in paragraph 3 below along with the values to be achieved at full-rate production after completion of the follow-on evaluation. Full maturity of RAM characteristics is expected to occur at approximately 100,000 flight hours.
 - g. (U) Operational Test Agencies:
 - (1) (U) US Army Forces Command (USAFORSCOM), Ft McPherson, GA.
 - (2) (U) US Army Training and Doctrine Command (USATRADOC), Ft Monroe, VA.
- h. (U) Independent Operational Test Agency: US Army Operational Test and Evaluation Agency (USAOTEA), Falls Church, VA.
 - System Characteristics:

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Operational/Technical Characteristics*	Objective	Demonstrated Performance** in Development	Current Est. wate for Production***
Primary Mission Gross Weight (PMGW)(1bs)	13910	14705	14660
Cruise Airspeed @ PMGW (Knots)	145~175	137	146
Vertical Rate of Climb at PMGW-(feet per			
minute)	450~500	180	770
Mission Reliability (Mesn time			
between failure in hours)	17.0-19.5	21.1	31.7
Weapon Accuracy (P _H) 30mm HELLFIRE (stationary targeta)			
Lateral acceleration (g's)	.2535	.33	.33
Endurance (hrs) - Primary Mission	1.83	1.23	1.83
- Alternate Mission	2.5-2.8	2.61	2.59
Expendable Ordnance at PMCW	275 210		2137
(HELLFIRE Missile No.)	8-12	8	8
(30MM rds)	320-500	320	320
Target Recognition (km) Maximum - Day - Night			
Target Designation (km) Maximum Day Night			
Haintenance Man-Hours per Flight Hour	8-13	5.65	8-13

NOTES: * Performance required at primary mission gross weight, operating within specified mission profiles.

** From the AAH Source Selection Evaluation Board (SSEB) final report, government developmental tests with
T700-GE-700 engine, and TADS/PNVS competition and testing at Yuma Proving Grounds.

*** T700-GE-701 Engine.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.12.A DOD Mission Area: #212 - Indirect Fire Support

Title: COBRA/TOW Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 2487	FY 1982 Estimate 19616	FY 1983 Estimate 12245	PY 1984 Estimate 4419	Additional to Completion	Total Estimated Cost 38767
D639	CORRA/TON	2487	19616	12245	4419	0	20747

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports development of a night/obscured battlefield antiarmor capability for the AH-IS, COBRA/TOW, by incorporating forward looking infrared (FLIR) in the TOW Missile system and control features for complete compatibility with the improved TOW and TOW 2 missile systems. These improvements will enhance the AH-1S CORRA Antiarmor capability and keep it an integral element of the ground combined arms team. The AH-1S is a single-engine, two-seat attack helicopter designed to employ the TOW missile, 20mm projectiles, and 2.75-inch rockets. Currently its capabilities are limited primarily to daytime operations. The AR-IS will complement the Army's primary attack helicopter, the AH-64, to be fielded in the mid-1980's.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: The requested funds will be for continuation of the development of forward-looking infrared (FLIR) capability in the COBRA/TOW telescope sight unit, and to develop the necessary digital control systems for complete compatibility with the improved TOW Missile and TOW 2.

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Program Element: #6.42.12.A

DOD Mission Area: #212 - Indirect Fire Support

Title: COBRA/TOW Budget Activity: #4 - Tactical Programs

Major Hilestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Development Contract for FACTS/I-TOW	Sep 1981	Apr 1981
Prototype Fabrication	Jul 1982	Not Shown
Contractor Testing	Jun 1983	Not Shown
DT/OT II	Jan 1984	Not Shown
Initial Production Contract	Jan 1984	Not Shown
Initial Product Acceptance	May 1986	Not Shown

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST (\$ 1n thousands):

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost	
RDTE					`\	_
Funds (current requirements)	2487	19616	12245	4419	38767	
Funds (as shown in FY 1982 submission)	8418	19676	8561	To Be Determined	To Be Determined	

The reduction in FY 1981 reflects program restructuring based on award of development contract in September 1981. The remaining funds were reprogramed to other Army programs. Increased funding was required in FY 1983 and FY 1984 to offset the F° 1981 reduction. The FY 1982 funding decrease is a result of the amended budget request and the application of revised inflation and civilian pay pricing indices.

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Program Element: #6.42.12.A

DOD Mission Area: #212 - Indirect Fire Support

Title: COBRA/TOW Budget Activity: \$4 - Tactical Programs

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

	FY 1981 Actual	PY 1982 Estimate	PY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Estimated Cost
Aircraft Procurement, Army: Funds (current requirements, New Aircraft)	46100	55700	-	~	-	1087400
Funds (as shown in FY 1982 submission)	44500	J	-	-	-	-
Quantities (current requirements)	15	12	-	-	_	
Quantities (as shown in FY 1982 submission)	17	-	-	-	-	~

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Total

Program Element: #6.42.12.A

DOD M.ssion Area: #212 - Indirect Fire Support

Title: COBRA/TOW

Budget Activity: #4 - Tactical Programs

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Funds (current requirements-						
Modification of Aircraft)	167900	77300	37400	49700	791800	1922200
Funds (as shown in FY 1982						
submission)	138900	33100	117200	-	219300	1277200
Quantities (current requirements)	76	0	-	-	~	-
Quantities (as shown in FY 1982						
submission)	76	0	-	-	-	-

Decrease of two aircraft in the FY 1981 new procurement quantity resulted from increased airframe and major ubsystem costs than originally estimated for 17 aircraft. The FY 1981 funding increase includes initial spares funding not reported in the FY 1982 submission. FY 1982 funding is a result of Congressional plus-up to procure 12 AH-1S. Under modification of aircraft, the FY 1981 increase includes initial spares funding and funding for additional aircraft survivability equipment through the FY 1981 supplemental. The FY 1982 increase is a result of amended budget request for additional aircraft survivability equipment for the Rapid Deployment Force. The FY 1983 reduction is a result of change in FY 1982 development schedule delaying procurement of the improved COBRA/TOW missile system by one year. The FY 1984 funding reflects delay in production of the COBRA/TOW Improved TOW missile system from 4Q FY 1984 to 2Q FY 1985 in order to fund higher priority Army programs.

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Program Element: #6.42.12.A

DOD Mission Area: #212 - Indirect Fire Support

Title: COBRA/TOW
Budget Activity: #4 - Tactical Programs

- P. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: To fulfill an urgent requirement for an operational serial antitank system, the Army initiated a development program to equip the AH-IG (COBRA) aircraft with the Tube-Launched Optically Tracked Wire-Guided (TOW) missile system. This system was designated as the AH-IQ. During operational testing of the AH-IQ, it was determined that substantial performance limitations resulted from the additional weight of the TOW missile system. A Product Improvement Program (PIP) was initiated in FY 1974 to alleviate the performance limitations in the area of hover performance and psyload capabilities. The program was low risk as the engine was state-of-the-art and is similar to an engine that had already undergone extensive testing. The transmission gear boxes and tail rotor were components already in service on the Marine Corps' AH-IJ helicopter. An AH-IQ modified by the installation of these components has an increase in maximum gross weight from 9,500 pounds to 10,000 pounds and is designated the AH-IS. Funds were approved in FY 1974 and FY 1975 to modify 290 existing AH-IG's. Additional funds were approved through FY 1981 to convert and modernize 378 more AH-IS COBRA/TOW's.
- G. (U) RELATED ACTIVITIES: Prior to the revised FY 1973 budget, the Improved COBRA Armsment Program (ICAP), which incorporated the TOW missile system on the COBRA, had been previously identified in Program Element (PE) 6.42.02.A, Aircraft Weapons. The funds for this armsment subsystem were shifted in FY 1977 to this program element. Also shifted to this element was the advanced technology program to develop a new COBRA main rotor blade. This advanced composite-material blade was previously funded under Advanced Structures, PE 6.32.11.A. All ongoing developmental COBRA improvement projects were consolidated under a single program element (6.42.12.A) to obtain optimum program management. The Office of the Secretary of Defense approved development of both the Army AH-IS and Marine AH-IJ helicopters because of different mission requirements.
- H. (U) WORK PERFORMED BY: Contractors: Bell Helicopter Textron, Ft. Worth, TX Airframe; Kamen Aerospace Corp., Bloomfield, CN; General Electric Armament Division, Burlington, VT Turret. In-house organizations: Aviation Research and Development Command, St. Louis, MO, and Ammunition Research and Development Command, Rock Island, IL. The progr > is managed by the Project Manager, COBRA, US Army Troop Support and Aviation Readiness Command, St. Louis, MO.

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Program Element: #6.42.12.A

DOD Mission Area: #212 - Indirect Fire Support

Title: COBRA/TOW

Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Development and qualification, including contractor and government testing, of the Universal Turret (UT) and Rocket Management Subayatem (RMS) was completed in October 1979. Production deliveries with the UT aubsystem began in September 1978. Fabrication of the prototype fire control subayatems was completed, and initial testing began in September 1978. The fire control subayatem developmental testing including operational issues was completed in November 1979. Ground operational checks, aerial nonfiring performance tests, and serial firing performance tests to verify accuracy and performance in all functional modes of pilot heads-up display (BUD), fire control computer (FCC), air data system (ADS), and laser rangefinder were accomplished. Full-scale engineering development of night capability for the COBRA/TOW by incorporating common module forward-looking infrared components into the COBRA/TOW telescopic sight unit was initiated. Initial contract was swarded to Bell Helicopter Textron for program definition and preliminary design review.
- 2. (U) FY 1982 Program: Continue engineering development of the FLIR-augmented COBRA/TOW sight (FACTS) and engineering to interface the improved TOW Missile System (ITMS) with the COBRA/TOW.
- 3. (U) FY 1983 Planned Program: Aircraft configuration definition will be completed. Trade-off study to define M65 TOW sight component changes will be completed, and qualification of FLIR package will be initiated. Prime contractor (BHT) begins fabrication of interfacing hardware for five prototype aircraft systems. Design of TOW missile guidance link improvements to the Missile Command amplifier will be initiated. Producibility engineering and planning will be initiated.
- 4. (U) FY 1984 Planned Program: Continue engineering development of the FLIR-augmented COBRA/TOW sight (FACTS), and complete necessary DT/OT tests leading to production decision.
- 5. (U) Program to Completion: Currently, it is anticipated that the FACTS development effort will be completed, and procurement initiated in FY 1985.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.42.16.A

DOD Mission Area: 7223 - Close Air Support
and Interdiction

Title: Aircraft Propulsion Systems
Budget Activity: 84 - Tactical Programs

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

Project Number	<u>Title</u>	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	0	0	1007	4317	Continuing	Not Applicable
DC 72	Aircraft Propulsion System	0	0	1007	4317	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides engineering development for essential improvements and development of aircraft propulsion systems, both engines and drive trains, and associated components and accessories in the area of flight safety, reliability, maintainability, durability, survivability, and fuel efficiency. The primary project is development of a common Army/Navy 5000 horsepower class engine which will result in a reduced fuel consumption of 20-25 percent in the Army CH-47 helicopter and an increase of 40-percent mission radius for the Navy P-3 aircraft. This program element is essential because it directly addresses the critical need for final development and qualification of propulsion systems and subsystems critical to the future operational effectiveness and mission capability of Army Aviation.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: The 5000-Horsepower Jodern Technology Engine (MTE) Project will provide engineering support for a Joint Army/Navy Program to develop, test, military-qualify, and integrate into the existing medium-lift and possibly future heavy-lift helicopters a 5000-horsepower modern technology engine (MTE) that will have been designed, fabricated, and demonstrated under program element 6.32.01, project D447, Demonstration Engines. This engine is needed by the Army for the CH-47 helicopter and by the Navy for its P-3 antisubmarine-warfare aircraft. For the CH-47 helicopter, the MTE will provide a 28-percent fuel savings for a transport mission, or 90-percent increase in payload at 4000 feet and 95°F conditions or a 40 to 50-percent increase in aircraft range for the same mission fuel. The reduction in size and weight of the MTE also means a reduction in critical materials. This new development engine will have a useful life until calendar year

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Program Element: 6.42.16.A

DOD Mission Area: #223 - Close Air Support
and Interdiction

Title: Aircraft Propulsion Systems

Budget Activity: \$4 - Tactical Programs

(CY) 2013, possess an integral particle seperator and lubrication system, integral overspeed protection, and digital self-diagnostic electronic control system with a design life of 5000 hours. Resulting aircraft improvements include reduced pilot workloads, engine load sharing, sutomatic restarting, reduced number of components and engine modular maintenance. An engine-mounted inertial separator to rectify sand erosion problems experienced on the AH-1 COBRA T-53 engine will be initiated and developed for retrofit.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	0	0	1007	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	N/A	H/A	N/A	Continuing	Not Applicable

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

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Program Element: 6.42.16.A

DOD Mission Area: #223 - Close Air Support
and Interdiction

Title: Aircraft Propulsion Systems
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: Modern Technology Engine (MTE) The Army and Navy both found they require an engine in the 5000-horsepower (hp) class. The Army need is to reduce fuel consumption of the CH-47 helicopter by 20 to 25 percent, and the Mavy need is to increase P-3 aircraft mission radius by 40 percent. The greatest future improvement in sircraft performance will result from use of lightweight, fuel-efficient engines. This can be achieved by higher operating temperatures and pressures, improved aero-thermodynamics, and advanced heat exchanges to give higher power-to-weight ratio engines with lower specific fuel consumption. Cycle analysis for a 5000-horsepower engine has been completed, and a review of component technology available has been conducted. Results show that the component technology appears to be available and needs demonstration. Discussions with the Navy have led to the potential formulation of a joint program for development of a new engine. An Army/Navy Memorandum of Understanding has been signed and a joint Memorandum of Agreement has been drafted and is currently being staffed for approval. Advanced Technology Engine (ATE) - Under program element 6.32.01, project D447, Demonstration Engine Program, two contractors (Aliison & Lycoming) have been testing 800-horsepower engines with integral advanced technology. These high-pressure-ratio, high-temperature engines have demonstrated 20-25% reduction in fuel consumption with highly reaponsive digital fuel controls and inlet particle separators in a configuration suitable for low-cost production with minimum critical mate, als. Additional benefits include: increased reliability and maintainability and reduced operating costs from the engine inlet practice separator, electronic fuel control system, integral lubrication system, and modular construction. This engine has been designed and sized for use in a single- or twin-engine version for a new generation of Army farily of light helicopters.
- G. (U) RELATED ACTIVITIES: Hateriel exchanges of information occur with the United States Air Force, the Navy, and National Aeronautics and Space Administration. Agencies are advised of program progress by semiannual meetings, a Tri-Service Aircraft Propulsion Technology Coordinating Paper, an informal Tri-Service Coordination Group, and numerous visits to industry. Related program element is 6.32.01.A, Aircraft Powerplants and Propulsion.
- B. (U) WORK PERFORMED BY: The program currently is the responsibility of the Directorate for Advanced Systems, US Army Aviation Research and Development Command, St. Louis, MO.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) PY 1981 and Prior Accomplishments: Not Applicable. This program has been unfunded.

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Program Element: 6.42.16.A

DOD Mission Area: #223 - Close Air Support
and Interdiction

Title: Aircraft Propulsion Systems
Budget Activity: #4 - Tactical Programs

- 2. (U) FY 1982 Program: Not applicable. This program has been unfunded.
- 3. (U) FY 1983 Planned Program: A contract will be awarded to Boeing Vertol for integration of the Modern Technology Engine (MTE) into the CH-47 medium-lift helicopter. This effort will include preliminary design of an engine nose gearbox and integration effort to specify engine inlet characteristics including foreign object damage screens, distortion levels, engine mounting characteristics, and airframe/engine control system interface characteristics including automatic starting and load sharing. Also, efforts will be initiated for development of an engine-mounted inertial separator.
- 4. (U) FY 1984 Planned Program: For Modern Technology Engine (MTE) Initiate aircraft transmission preliminary design and final engine design. Also order long-leadtime items for engine development and qualification program. For Advanced Technology Engine (ATE) A development and qualification program will be initiated with final engine design and order of long-leadtime material for the development and qualification program.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6, 2.17,A
DOD Mission Area: #215 - Land Warfare Support

Title: Synthetic Flight Training Systems
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL POR PROGRAM ELEMENT	560	3063	30951	21053	Continuing	Not Applicable
D275	Synthetic Flight Training Systems	560	3063	30951	21053	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program develops high-fidelity operational flight, weapon subsystems, and mission environment helicopter simulators to support initial entry rotary-wing training and combat operational training. This simulator development will provide a realistic and cost effective training by producing simulation of the combat environment for tactical flight, to include nap-of-the-earth (NOE), weapons engagement, and enemy interaction. The simulators are used to complement the training accomplished in actual helicopters during formal courses of instruction and for maintenance of combat readiness for rated Aviators.

C. (U) BASIS FOR FY 1983 RDTE REQUEST: Continue full-scale engineering development of the combat mission simulator for the AH-64, Advanced Attack Helicopter including the simulation of the gunner's Target Acquisition Designation Sensor (TADS), the Pilot's Night Vision Sensor (PNVS), and all weapon subsystems on the AH-64. Development of a Combat Mission Simulator (CMS) would permit the Army to cost effectively train pilots to fly and deliver the weapons of the advance attack helicopter, AH-64.

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Program Element: #6.42.17.A

DOD Mission Area: #215 - Land Warfare Support

Title: Synthetic Flight Training Systems

Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	560	3063	30951	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	0	8333	5160	Continuing	Not Applicable

The increase of \$560 thousand in FY 1981 resulted from reprograming funds from Project Element #6.32.16.A, 'ynthetic Flight Simulators. FY82 will begin engineering development of prototype combat mission simulator. The reduction : a this fiscal year was from Congressional action. The increase in FY83 is for computer hardware, simulator motion system, and for software meth model development for the AH64 combat mission simulator.

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

	FY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	FY 1934 Estimate	Additional to Completion	Total Estimated Cost
Aircraft Procurement, Army						
Funds (current requirements)	0	31700	56000	67800	Continuing	Not Applicable
Funds (as shown in FY 1982						
submission)	0	31300	TBD	Not Shown		
Quantities (current requirements)	0	1(AH1S)	3(AH-1S) 1(CH-47)	3(UH-60) 1(CH-47)	Continuing	Not Applicable
Quantities (as shown in FY 1982				,		
submission)	0	2(AH-1S) 1(CH47)	2(AH-1S)	Not Shown	Continuing	Not Applicable

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Program Element: #6.42.17.A

DOD Mission Area: #215 - Land Warfere Support

Title: Synthetic Flight Training Systems
Budget Activity: 64 - Tactical Programs

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Military Construction, Army Funds (current requirements)	0	0	o	3500	Continuing	Not Applicable
Funds (as shown in PY 1982 submission)	0	10200	2700	Not Shown	Continuing	Not Applicable

Funding in FY81 was deferred due to resource requirements of higher priority programs. Aircraft Procurement, Army and Military Construction, Army data submission was not required for FY81 deferred programs.

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Program Element: #6.42.17.A

DOD Mission Ares: #215 - Land Warfare Support

Title: Synthetic Flight Training Systems
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program develops a family of high-fidelity flight, weapon subsystems, and mission environment helicopter simulators to support initial entry helicopter pilot training, transition training, and combat operational training. A major thrust is the development of a simulation of the combat environment for tactical flight, including nap-of-the-earth (NOE), weapons engagement, and enemy interaction, to provide realistic and cost effective training in a totally safe environment. The simulators complement the training accomplished in actual helicopters during formal courses of instruction and for maintenance of combat readiness for rated Aviators. Each simulator includes a replica of the helicopter cockpit, mounted on a motion system, plus an instructor's station with the equipment necessary for the instructor to control the training scenario, the operating environment, and the measurement of the pilot's performance. Each simulator includes a visual system to provide the aircrew with a view of the terrain outside the helicopter. The FY 1982 funding will initiate the Engineering Development of the AH-64 Combat Mission Simulator. This training device will be capable of simulating the full combat mission to include hostile enemy interaction. All AH-64A flight and weapons systems required for aircrew training, to include the gunner's target Acquisition Designation Sensor (TADS) and the Pilot's Night Vision Sight (PNVS), will be incorporated in the simulator.
- G. (U) RELATED ACTIVITIES: Program Elements 6.32.16.A, Synthetic Flight Simulators, and 6.27.27.A, Non-Systems Training Device Technology. These activities are engaged in flight simulation component research and development.
- H. (U) WORK PERFORMED BY: Link Division, The Singer Co., Binghamton, NY, for development of the AH-1, CH-47, and UH-60 simulators. Developing contractor for the AH-64 Comhat Mission Simulator has not been selected. Responsible developing agency is the US Army Project Manager for Training Devices collocated with the US Naval Training Equipment Center, Orlando, FL.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: The first simulator developed under this program was an instrument flight and emergency simulator modeled after the UH-1 helicopter. Development was completed in FY 1972. Production is now complete, and 22 of these simulators are in service at 16 locations worldwide. The second simulator developed provides transition and combat readiness flight training for pilots of the CH-47 helicopter. The simulator underwent development and operational testing in FY 1977 and demonstrated a highly satisfactory cumulative transfer effectiveness ratio (CTER) of .85 to 1. In FY 1978 the CH-47 flight simulator was type classified. Production of five follow-on units began in FY 1979. The third simulator, simulating the AH-1 helicopter, completed development in FY 1980 and was type classified in FY 1980. The

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Program Element: #6.42.17.A

DOD Mission Area: #215 - Land Warfare Support

Title: Synthetic Flight Training Systems
Budget Activity: 54 - Tactical Programs

UH-60 Flight Simulator prototype was accepted by the Army in the second quarter of FY 1980 and is undergoing Development and Operational Testing at the US Army Aviation Center.

- 2. (U) FY 1982 Program: Initiate full-scale engineering development of the combat mission simulator for the Advanced Attack Helicopter. It is anticipated that long-lead items and government-furnished equipment (GFE) will require most of the available funds.
- 3. (U) FY 1983 Planned Program: Continue the development of the combat mission simulator for the Advanced Attack Relicopter.
 - 4. (U) FY 1984 Planned Program: Continue development of AH-64 combat mission simulator.
- 5. (U) Program to Completion: This is a continuing program. The development effort for the AH-64 combat mission simulator is expected to continue into FY 1985. Development of the Army Helicopter Improvement Program (AHIP) simulator and a visual system for the UH-1 helicopter will start initial development in FY85.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.18.A

DOD Mission Area: #215 - Land Warfare Support

Title: Airdrop Equipment Development
Budget Activity: #4 - Tactical Programs

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

Project Number	<u>Title</u>	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT OUANTITIES	1008	2918	3136	4144	Continuing	Not Applicable Not Applicable
D279	Airdrop Equipment Development	1008	2918	3136	4144	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports engineering development and type classification of airdrop components and systems used by all uniformed services for airborne assault, special operations, and airdrop resupply of both conventional and airborne forces. The development of personnel and cargo parachutes, airdrop containers and associated support equipment is included in this program. The program together with related program elements (6.22.10A and 6.32.18A) addresses the following tems, to insert fighting-ready airdrop forces and material accurately and coherently, and to airdrop large fire and combat support systems. The airdrop projects are included in the Army (US Army Training and Doctrine Command (TRADOC)) critical category priority list for support of combat operations. The program directly supports the XVIIIth Airborne Corps and Rapid Deployment Force contingency plans for the deployment of an airborne unit, and thus is vital to national defense. The airdrop of supplies is increasing in importance in view of the increased need for a k pid Deployment Force and the extended distances characteristic of many contingencies that could involve the vital interests of the US. Through data exchange agreements and standardization working groups, the program fulfills essential sirdrop mission and technology needs of many allied countries.

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Program Element: #6.42.18.A

DOD Mission Area: #215 - Land Warfare Support

Title: Airdrop Equipment Development
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1983 RDTE REQUEST: Complete development and type classify a new universal airdrop platform (Type V), the High-Altitude Airdrop Resupply System (500-pound capacity), and a military Freefall Instructional Parachute Training System. Continue development of the Two-Staged Personnel Parachute System with accompanying loads for use by Special Forces, a 60,000-pound-capacity airdrop system to provide an urgently needed capability to the XVIIIth Airborne Corps as well as a capability to reconstitute armored forces through airdrop; and the Tactical Assault Personnel Parachute to fulfill the needs of the XVIIIth Airborne Corps for a personnel parachute for use at altitudes as low as 300 feet. Continue to provide engineering support to the Air Force during the development of airdrop/air transport aircraft. Initiate development of the High-Speed Container Airdrop System to upgrade the capability to airdrop critically needed supplies from high-performance aircraft.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	1008	2918	3136	Continuing	Not Applicable
runus (as snown in ri 1702 submission)	2507	3126	4656	Continuing	Not Applicable

The FY 1981 reduction of \$1499 thousand reflects a reprograming of funds to higher priority Army requirements and revised inflation indices. The funding decrease of \$208 thousand in FY 1982 is attributable to revised inflation indices and a Congressional disapproval of funds to assist the USAF in the anticipated development of the C-17 aircraft. The \$1520 thousand decrease in FY 1983 is the result of the transfer of funds to higher priority efforts outside the airdrop program.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable, (NOTE: Airdrop items are stock fund procured and managed.)

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Program Element: #6.42.18.A

DOD Mission Area: #215 - Land Warfare Support

Title: Airdrop Equipment Development
Budget Activity: #4 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: The ongoing work under this program is dedicated to the development and fielding of airdrop systems, components, and techniques which will increase the mission capabilities of airdrop operations, reduce operational costs, increase reliability of airdrop materials and survivability of personnel and aircraft, and improve the readiness posture of airborne and airlift forces. The program supports Army, Marine Corps, Air Force, Navy, and Allied Forces (as requested). The major efforts through Fiscal Year 1984 are focused on: providing a capability to airdrop heavy, outsize combat materiel up to 60,000 pounds; fleiding a single platform usable for both the low Altitude Parachute Extraction System and regular low-velocity airdrops; extending the capability to airdrop personnel at higher speeds/lower altitudes and at large offsets from target areas with precision; improving the personnel reserve parachute for military freefall; new methods and equipment for enhancing the link-up of men and material after airdrop; providing a capability to airdrop related combat materiel on linked platforms; upgrading the capability to deliver critically needed supplies from high-performance aircraft; providing airdrop/air transport development programs; and providing a capability to airdrop personnel from altitudes as low as 300 feet in order to degrade threat capabilities to defeat airlift aircraft.
- G. (U) RELATED ACTIVITIES: Program Element's 6.22.10.A, Airdrop Technology, and 6.32.18.A, Airdrop Equipment and Techniques; Joint Technical Airdrop Group; Joint Air Movements Board; North Atlantic Treaty Organization (NATO) Air Transport Working Party; Air Standardization Coordinating Group, Working Party 44; Mutual Weapons Data Exchange Agreements with France, Germany, and Kores; United States/Germany Normajor Items Meetings.
- H. (U) WORK PERFORMED BY: Metric Systems, Inc., Ft. Walton Beach, FL; Irvin Industries Canada Ltd, Fort Erie, Ontario; Strong Enterprises, Orlando, FL; Army Yuma Proving Ground, Yuma, AZ; Army Electronics Warfare Laboratory, Ft. Monmouth, NJ; Naval Ordnance Station, Indian Head, MD; US Army Natick Research and Development Laboratories, Natick, MA.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAM:
- 1. (U) FY 1981 and Prior Accomplishments: Four new and improved systems were fielded during the prior four years. These were: Ramp Bundle Delivery System for the C-100 Aircraft; Dragon Hissile Jump Pack; Navy Emergency Air Cargo Delivery System; and High-Altitude Airdrop Resupply System (2000-pound capacity). In addition, 128 items of priority munitions were qualified for airdrop. During FY 1981, the design phase of the new airdrop platform (Type V) was completed and level II developmental and operational testing initiated; the Freefall Haneuverable Reserve Parachute task was redirected to meet new Special Forces needs for a higher performance capability; the design phase of the High-Altitude Airdrop Resupply System

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Program Element: #6.42.18.A

DOD Mission Area: #215 - Land Warfare Support

Title: Airdrop Equipment Development
Budget Activity: #4 - Tactical Programs

(500-pound capacity) was completed and test items shipped to the test site; the design of the extraction subsystem for the 60,000-pound-capacity Airdrop System was initiated; and Army airdrop engineers participated in the source selection of the C-X (now C-17) aircraft.

- 2. (U) FY 1982 Program: Design components, fabricate engineering design test quantities, and initiate design tests of critical components of 60,000-pound-capacity Airdrop System. Continue Level II development and operational testing of new universal airdrop platform (Type V), continue participation in the development of the Air Force C-17 aircraft, and identify needed related Army airdrop developments. Complete Level II testing of High-Altitude Airdrop Resupply System, 500-pound capacity. Transition from Advanced Development and initiate Engineering Development of Two-Staged Personnel Parachute System. Type classify High-Speed Container Airdrop System (CTU-2A). Complete development and type classification of the Freefall Maneuverable Reserve Parachute. Start development of Tactical Assault Personnel Parachute.
- 3. (U) FY 1983 Planned Program: Complete testing and type classification of the new universal airdrop platform (Type V), and High-Altitude Airdrop Resupply System (500-pound capacity). Continue design and testing of components for 60,000-pound-capacity airdrop system. Complete the computer simulation model of cargo-loading operations for air transport aircraft and provide airdrop/air transport engineering assistance to developers of Army materiel. Continue to participate in design reviews, test planning, and airdrop engineering evaluations of Air Force airdrop/air transport developmental aircraft. Complete engineering design and initiate development and operational testing of Two-Staged Personnel Parachute System with accompanying bundles and the Tactical Assault Personnel Parachute. Initiate design of High-Speed Container Airdrop System (Mach 1) for use with high-performance Air Force aircraft.

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Program Element: #6,42,18.A
DOD Mission Ares: #215 - Land Warfare Support

Title: Airdrop Equipment Development
Budget Activity: #4 - Tactical Programs

- 4. (U) FY 1984 Planned Program: Complete development and type classification of the Two-Staged Personnel Parachute System with accompanying Bundles and the Tactical Assault Personnel Parachute. Continue engineering development of the 60,000-pound-capacity Airdrop System, Airdrop Engineering Support to USAF conceptual and developmental aircraft programs, and the full-scale development of the High-Speed Container Airdrop System (Mach 1). Complete Advanced Development and initiate Engineering Development of Drop Zone Assembly Aids which will provide for rapid assembly of personnel and their equipment on the drop zone and a system to airdrop linked, tandem platforms (Airdrop Controlled Exit System). Initiate development of a Tactical Assault Container Delivery System for the airdrop of cargo from 300 feet. This latter system is a companion to the Tactical Assault Personnel Parachute and will increase the likelihood of mission success when low-level airdrop is required.
 - 5. (U) Program to Completion: This is a continuing program.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.20.A
DDD Mission Area: #217 - Land Warfare Surveillance

Title: Army Helicopter Improvement Program
Budget Activity: #4 - Tactical Programs

and Reconnaissance

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 25657	FY 1982 Estimate 38497	FY 1963 Estimate 75811	FY 1984 Estimate 55666	Additional to Completion 24990	Total Estimated Cost 228062 5
D516	Army helicopter improvement Program (AhlP)	25657	38497	75811	55666	24990	228062

B. (U) BRIEF DESCRIPTION OF ELEMENI AND MISSION NEED: In fighting the air-land battle, commanders may often be forced to concentrate the bulk of their combat power at critical places and times, taking risks on their flanks and operating with small resources. In this environment, it is essential that commanders have a highly survivable, flexible, and responsive means to acquire and designate critical targets and to conduct reconnaissance, surveillance, and security operations in day, night, and reduced-visibility conditions. The Army Helicopter Improvement Program (AHIP), a modified OH-58 aircraft, will operate in air cavalry, attack helicopter, and field artillery units. In the antiarmor role, the AHIP and attack helicopters will operate in close harmony as hunter/killer teams. In support of field artillery, the AHIP will provide conventional artillery spotting and precision laser designation for the Copperhead. In all roles, the AHIP will provide a day/night/limited-visibility target acquisition and laser designation system at standoff ranges for Army and Air Force laser-guided munitions through incorporation of a hast-Mounted Sight (MMS). The MMS will enhance survivability by allowing surveillance, target acquisition, and target designation with only the MMS exposed. The AHIP will also include the integration of an improved Nap-of-the-Earth (NOE) communication and navigation system as well as space, weight, power, and structural provisions for later incorporation of an air-to-air Kultipurpose Lightweight Missile (MLM) system as a self-defense capability. Aircraft performance will be improved to provide an acceptable hot-day, high-altitude NOE and flight maneuver capability for worldwide deployment. The AHIP will be a highly survivable, mobile, flexible system providing a full range of support to the Ground Commanders.

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Program Element: #6.42.20.A

DOD Mission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Improvement Program
Budget Activity: #4 - Tactical Programs

C. (U) BASIS FOR FY 1983 RDTE REQUEST: FY 1983 is a pivotal year for the Army Belicopter Improvement Program (ABIP). Requested funds will provide for continuation of the Full-Scale Engineering Development effort, starting with the Critical Design Review and encompassing aircraft preparation and maintenance, fabrication, tooling, integration, final assembly, and contractor testing of prototype aircraft. Additional efforts include Producibility Engineering and Planning (PEP), continued systems integration testing, safety-of-flight and final mission equipment reviews, and in-house suppor. Special emphasis in FY 1983 will be placed on bench tests and qualification of major components to allow for initia ion of contractor flight testing and for the release of long-leadtime procurement items, which are critical to the attainment of lnitial Operational Capability (IOC) in 1986.

Mejor Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Concept Formulation Package*	Oct 79	Oct 79
Special Army Systems Acquisition	000 77	GCL 77
Review Council (ASARC)*	Nov 79	Nov 79
Office of the Secretary of Defense		
Program Reviews	Dec 79	Dec 79
ASARC Management Review	Jul 80	Jul 80
Required Operational Capability		
(ROC)	Jan 81	Not Shown
Request for Proposal (RFP) Release		
for Army helicopter improvement		
Program (AhiP)	jan 81	Jan 81
AhlP Source Selection Evaluation	1/	
Board (SSEB)	Apr-Aug 81 1/	Apr-Jun 81
Engineering Development Contract Award	Sep 81 4/	Aug 81
Preliminary Design Review	Mar 82	Not Shown
Critical Design Review	Nov 82	Not Shown
Long-Leadtime Items Release	Jun 85	Not Shown
Initial Flight Demonstration	Oct 83	Not Shown
In-Process Review	Feb 84	Not Shown

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Program Element: \$6.42.20.A

DOD Mission Area: \$217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Improvement Program
Budget Activity: #4 - Tactical Programs

	Current	Kilestone Dates
Major Milestones	Milestone Dates	Shown in FY 1982 Submission
Long-Lead Tooling and		
Fabrication kelease	Feb 84	hot Shown
Pirst Production Option Release	Jun 84	Not Shown
Development Testing/Operational		
Testing (DT/OT)	Jul 84-Jan 85	Not Shown
Milestone III Decision	Apr 85	Not Shown
Production Award	Jun 85	Not Shown
Production Delivery Begins	Oct 85	Not Shown
Initial Operational Capability (IOC)	Jun 86 3/	Mar 86

*Performed under Project D261, PE 6.42.03.A.

- 1/ (U) Extended to allow for additional contractor data evaluation.
- 2/ (U) Decision reviews to Under Secretary of the Army and Under Secretary of Defense Research and Engineering delayed from previous date.
- 3/ (U) Current estimate reflects a change due to schedul. slippage of award of engineering development contract and requirement for contractor's proposal and negotiation of a ceiling price on production options for FY84 and FY85 before beginning the engineering development on 1 November 1981.

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Program Llement: \$6.42.20.A

DOb hission Area: \$217 - Land Warfare Surveillance and Reconnaissance

Title: Army Helicopter Improvement Program
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RETE REQUEST: (\$ in thousands)

·	FY 1981	FY 1982	FY 1963	Additional To Completion	Total Estimated Cost
RDTL Funds (current requirements) Funds (as shown in FY 1982	25657	38497	75811	80656	228062
submission)	25657	38617	45876	33205	143355

FY 1982 - \$62 of the \$120 decrease due to OSD inflation guidance reflecting lower indices in March 1981 than September 1980; \$56 decrease due to Joint Appropriations Bill action.

FY 1965 - \$29935 net increase includes cost increases in aircraft preparation and maintenance, airframe modification, engines, M65/control display system, system project management, peculiar ground support equipment, data, technical publications, TRACE and in-house support.

Additional to Completion - \$47451 net increase reflects overall program changes incurred during definitization, including coverage of contract ceiling costs.

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

	FY 1981 Actual	FY 1962 Estimate	FY '983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Aircraft Procurement, Army						
Funds (current requirements)	O	0	45107	167421	2090951	2303479
Funds (as shown in FY 1982						
submission)	0	0	To be determined	-	-	lo be determined

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Program Llement: #6.42.20.A

DOD Mission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Improvement Program
Budget Activity: #4 - Tactical Programs

	FY 1961 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Quantities (current requirements)	0	O	Long-Lead- time Items	16	562	578
Quantities (as shown in FY 1982 submission)	0	0	0	0	720	720

- (U) Estimated procurement quantity, resulting from the Baseline Cost Estimate, is 578 aircraft in lieu of the 720 aircraft quantity shown in the FY 1982 submission. The quantity of 720 was based on Required Operational Capability (ROC) requirements; dollar requirements were estimated in the ABIP Cost and Operational Effectiveness Analysis (COEA), dated August 1980, utilizing a "generic" aircraft as a base. Evaluation of data provided by the AHIP RDTE Source Selection Evaluation Board during April-August 1981 resulted in the decreased quantity to stay "thin defined Program Objective Memorandum (POM) and Extended Planning Annex (EPA) budget line, while still equipping all high-priority units.
- a. (U) \$45.1 million in FY 1983 will cover costs for long-leadtime items including transmission, gearboxes, main rotor masts, material for main rotor blades, electrical components, castings, forgings, bearings, hydraulic actuators, sensors, microelectronics parts, tooling, engines, and avionics.
- b. (U) \$167.4 million in FY 1984 will provide additional long-leadtime items as depicted for FY 1983 and production of 16 aircraft including system test and evaluation, data, training hardware, peculiar ground support equipment, and spares.
- c. (U) \$2091.0 million from FY 1985 to completion will provide tooling required for increased fiscal year procurement buys to meet schedule, long-lead releases for engines and avionics items, and production of 562 sircraft including engineering change proposals, system test and evaluation data, training hardware, peculiar ground support equipment and spares.

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rogram Element: #6.42.20.A

DOD Mission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Improvement Programs
Budget Activity: #4 - Tactical Programs

. (U) DETAILED BACKGROUND AND DESCRIPTION: In January 1974, Headquarters, Department of the Army, approved a Required perational Capability (ROC) for an Advanced Scout Helicopter (ASH). A special task force reviewed the need for an aerial scout and conducted concept formulation efforts and trade-off analyses and evaluations during FY 1975. In February 1975, an Army Systems Acquisition Review Council (ASARC) approved the need for the ASM and the initiation of hardware development. The need and initiation of a development program was subsequently approved by the Department of Defense Systems Acquisition Review Council (DSARC) in September 1975. Both the Army and the Department of Defense concluded that some commonality between the ASh and potential future helicopters in its weight class, such as a light attack or a light utility, was probably achievable. In March 1976, the DSARC again reviewed the Army's program and reaffirmed support for a helicopter in the weight class of ASh. It approved development of a Target Acquisition Designation System (TADS) and Pilot Night Vision System (PNVS) to be common to the ASH and Advanced Attack Helicopter (AAH). Subsequent Congressional action denied the ASH FY 1977 funding request, increased the AAk funds to provide development of TADS and PNVS, and provided guidance to disestablish the ASH Project Office. Congress indicated, however, that the ASH program would be considered later if proposed by the Army. The requirement continues, and the Army requested FY 1979 funds, which were provided by Congress, to support the analyses and system trade-off studies required to determine the best candidate systems to meet an updated requirement. A special study group was also established to refine the specifics of the requirement and to thoroughly explore 'll candidate systems, and the ASH Projett Office was reestablished 1 June 1979. This work was completed in October 1979. A Special ASH ASARC on 30 November 1979 reaffirmed the Army's need for an ASh. However, specific requirements of the updated ROC were not approved. The Special ASAKC also looked at the affordability issue and concluded that a full ASH development program to eet the RCC could not be supported under present funding constraints. The Special ASARC determined that Mast-Hounted Sight (MMS) technology was sufficiently mature to apply to an existing airframe and directed initiation of a near-term scout program through modification of an existing aircraft. The AHIP which resulted from this decision will furnish an urgently needed capability that is compatible with the attack helicopter fleet and precision-guided munitions (e.g., HELLFIRE and COPPERHEAD), and provide a logical step toward the most survivable combat force. Analyses clearly indicate when committed to battle the MMS helicopter significantly increases attack/MMS helicopter team survivability, and also improves the total force loss exchange ratio. The ASH program (Project D2bl) was canceled by the Office of the Secretary of Defense (OSD) at the end of FY 1960, and the effort was redirected toward integration of an MMS with an existing inventory airframe to continue under a new program element (PE #6.42.20.A) and title (Army Helicopter Improvement Program (AHIP)). The OSD decision precluded new airframe development and withheld commitment for any procurement. After user developer mission profile and MMS/detectability evaluations were conducted in the spring of 1980, an ASARC Management Review in July 1980 approved a program to compete MMS development and integration on existing inventory airframes. An Ahil ROC was approved 9 January 1981,

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Program Element: #6.42.20.A

DOD Hission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army helicopter Improvement Program
Budget Activity: #4 - Tactical Programs

and formal request for proposal was released on the same date. A Source Selection Evaluation Board (SSEB) convened in April 1981 and resulted in award of the full-scale engineering development contract to Bell Helicopter Textron on 21 September 1981 to modify the OH-58 aircraft. The AHIP program will provide a day/night/adverse weather target acquisition and laser designation capability through incorporation of the MMS into OH-58 aircraft. The AHIP will also include the integration of an improved Nap-of-the-Earth (NOE) communication and navigation system and apace, weight, power, and structural provisions for later incorporation of an air-to-air Multipurpose Lightweight Missile (MLM) system as a self-defense capability. Aircraft performance will be improved to provide an acceptable hot-day performance capability for deployment worldwide. Improved handling qualities and reduced crew workload are included. The standoff range capability and reduced detectability provided by the MMS and the ultimate inclusion of the self-protection capability will enable the AHIP to perform in all intensities of warfare and support air cavalry, attack helicopters, and field artillery units with a significant improvement in survivability. The hOE communication/navigation improvements will provide necessary aircraft and target location accuracy and facilitate better and more reliable communication between the AHIP crew, command elements, and companion aircraft.

- G. (U) RELATED ACTIVITIES: Previous aerial acout program concept and program formulation efforts were conducted under program element \$6.32.05.A, Aerial Scout, and 6.42.03.A, Advanced Scout. A portion of PE 6.42.03.A, Advanced Scout, FY 1980 funding was used to support initial phases of the ABIP full-scale engineering development. Weapon systems being developed under elements 6.46.21.A and 6.43.10.A, Heliborne Missile HELLFIRE, and program element 6.46.21.A, COPPERHEAD, may use the terminal homing guidance provided by the mast-mounted laser designator on the AHIP.
- H. (U) WORK PERFORMED BY: A contract for engineering development of the airframe and mast-mounted sight was awarded to Bell Helicopter Textron, Fort Worth, TX, on 21 September 1981. Subcontractors to be utilized by Bell Helicopter Textron include McDonnell Douglas Astronautics Company, huntington Beach, CA, in association with Northrop Corporation, Anaheim, CA, for the mast-mounted sight; Sperry Fligh: Systems, Phoenix, A2, for controls displays; Detroit Diesel Allison, Indianapolis, IN, for engines; Collins Communications, Celar Rapids, IA, for new high frequency radios; Litton Systems, Van Nuys, CA, for attitude and heading reference subsystems; and Singer-Kearfott, Little Falls, NJ, for doppler navigation. The ASH Project Hanagement Office, St. Louis, MO, is the responsible developing organization.

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Program Element: #6.42.20.A

DOD Mission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Improvement Program
Budget Activity: 14 - Tactical Programs

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: Covered under Program Element 6.42.03.A, D281 and D304: FY 1979 effort encompassed overall concept formulation and requirements documentation, feasibility studies, and trade-off analyses (including North Atlantic Treaty Organization/Rationalization Standardization Interoperability (NATO/RSI) potential) and cost and operational effectiveness analyses (COEA) for the Advanced Scout Helicopter (ASH). FY 1980 effort continued under Project D281 and included an ASH Special ASARC on 30 November 1979, Office of the Secretary of Defense (OSD) review on 18 December 1979, ASARC management review on 10 July 1980, and Department of the Army (DA) and US Army Materiel Development and Readiness Command (DARCOM) acquisition strategy reviews on 26 July 1960. An Army Helicopter Improvement Program (AHIP) COEA was submitted on 21 August 1980. The AHIP was assigned Program Element 6.42.20.A, Project D518, beginning with FY 1981. The Determination and Findings (D&F) was approved 24 October 1980, which led to release of draft Request for Proposal (RFP) for industry comment on 7 November 1980, followed by Required Operational Capability (ROC) approval and formal RFP release on 9 January 1981. The initial "For Comment" Decision Coordinating Paper (DCP) and Integrated Program Summary (IPS) were submitted to DA in April 1981 and the Acquisition Plan was approved on 29 April 1981. A Source Selection Evaluation Board (SSEB) convened in early April 1981, which resulted in award of the full-scale engineering development contract on 21 September 1981.
- 2. (U) FY 1982 Program: Continuation of full-scale engineering development; includes systems engineering management, initial aircraft preparation and maintenance, aircraft engineering design, preliminary tooling design, aircraft assembly and component fabrication, procurement of GFE, MMS, engines and control display systems, initial systems integration tests, and Logistics Support Analysis (LSA).
- 3. (U) FY 1983 Planned Program: Continuation of full-scale engineering development; includes conduct of the Critical Design Review, system engineering management, completion of aircraft preparation and maintenance, fabrication of prototype tooling, integration and final assembly of prototype aircraft, systems integration tests, static test, whirl tests, initial flight testing and Producibility Engineering Planning (PEP) effort. Particular effort will be focused on qualification of major components as a prerequisite to release of long-leadtime items for initial production requirements.
- 4. (U) FY 1984 Planned Program: Continuation of full-scale engineering development; includes system engineering management systems integration tests, logistics, training, Preliminary Airworthiness Evaluation (PAE), Development Test/Operational Test 11 (DT/O1 11) and PEP effort.

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Program Element: #6.42.20.A

DOD Mission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Improvement Program
Budget Activity: #4 - Tactical Programs

5. (U) Program to Completion: Award of final (FY 1985) final increment of the engineering development contract; includes system engineering management, continuance until completion of DT/OT II, Skill Performance Aids (SPA) verification, final delivery of prototypes to the Army and completion of PEP effort.

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FY 1983 RDTE CONCRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.20 A
DOD Mission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Improvement Program

Budget Activity: #4 - Tactical Programs

J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: Development Test and Evaluation will be conducted by the contractor, Bell Helicopter Textron, Ft. Worth, TX; the Mast-Mounted Sight subcontractor, McDonnell Douglas Astronautics Company, Huntington Beach, CA; US Army Test and Evaluation Command (TECOM), Ft. Rucker, AL, and Yuma Proving Ground, AZ; US Army Missile Command (MICOM), Huntsville, AL; US Army Night Vision and Electro-Optics Laboratory (NVEOL), Ft. Belvoir, VA; and US Army Aviation Engineering Flight Activity (AEFA), Edwards AFB, CA. Contractor and Covernment development testing will utilize five prototype Army Helicopter Improvement Program (AHIP) aircraft and six Mast-Mounted Sights (MMS). Contractor and subcontractor development testing is scheduled for completion in July 1984. Contractors will perform functional tests at the component and system levels in accordance with a Government-approved Airworthiness Qualification Specification (AQS) and System Qualification Specification (SQS) to demonstrate compliance with specification performance requirements and qualification requirements. Contractors will perform environmental compliance and qualification testing at the component and system levels. A preliminary Airworthiness Evaluation (PAE) will be conducted by the US Army Engineering Flight Activity (AEFA) during the contractor's development flight test program to develop initial handling qualities data and information for issuance of an airworthiness release and to establish baseline information for follow-on Government flight testing-Government laboratory development testing (MICOM and NVEOL) of one MMS is scheduled for November 1983 to March 1984. Government laboratories will accomplish independent tests on selected critical MMS components to verify that the MMS meets specification; provide data to the contractors; and to evaluate the performance of the MMS in conjunction with weapon systems such as HELLFIRE and COPPERHEAD. Government (TECOM) development testing on three AHIP Prototypes is scheduled for July to September 1984. TECCM will evaluate helicopter operating performance, safety, human factors, maintenance, ground handling, Reliability, Availability, and Maintainability (RAM), air transportability, special mission kits and equipment, environmental and associated training packages. This test will consist of a total of 300 flying hours. Additional Government development testing on one AHIP prototype is scheduled for July 1984 to January 1985. This testing will be conducted by the US Army Engineering Flight Activity (AEFA) and will consist of an Airworthiness and Flight Characteristics (AEFC) evaluation. Government Skill Performance Aids (SPA) verification will utilize one AHIP prototype from July 1984 to Febru vy 1985. Development test emphasis will be placed on crew performance, the performance of the MMS and avionic subsystems, the interface between the subsystems and the aircraft, the interface between the AHIP and other airborne and/or ground combat systems, and the effect of on-board systems on the serodynamic performance of the sircraft. Testing of the AHIP will be accomplished in a series of subtests, surveys, demonstrations, and analyses to address the test issues and system performance requirements. To facilitate the coordination, interface, and integration of the AHIP developmental and operational test UNCLASSIFIED

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Program Element: #6,42.20.A
DOD Mission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Inprovement Program
Budget Activity: #4 - Tactical Programs

requirements, a Test Integration Working Group (TIWG) has been established. The AHIP TIWG will expedite the Coordinated Test Program (CTP) and the Test and Evaluation Master Plan (TEMP) preparation and execution process. This will insure efficient and effective use of prototypes and eliminate testing redundancy by the integration of test requirements to the maximum extent.

2. (U) Operational Test and Evaluation: Operational Test II (OT II) will be independently conducted by the US Army Operational Test and Evaluation Agency (OTEA) at Ft. Hunter-Liggett, CA, Ft. Carson, CO, and/or Ft. Hood, TX. The test objective includes an assessment of the operational effectiveness of the AHIP to include performance, reliability, availability, and maintainability (RAM) characteristics and logistic support. Supportability elements will include ground support equipment, manuals, and training. The OT II will utilize three prototype AHIP sircraft for 5 months and accumulate approximately 500 flight hours. OT II testing is scheduled to commence in the fourth quarter of CY84 and be completed by second quarter CY85.

3. (U) System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated Performance
Total Mission Weight (1bs)	4016	To be determined thru testing of
Mission Equipment Package (1bs)	(579)	prototype AHIP aircraft
Multipurpose Lightweight Missile		
(SWP) (1bs)	(135)	
Vertical Rate of Climb (VROC) (FPM)		
@ 4K/95°	500	
@ 2K/70°	650	
Velcrity (IRP-Kts)	112 (4K/95°)	
Endurance (Hours)	2.4	
Operational Mission	.70	
Reliability for a 4-hour mission		
Maintenance Reliability (MTBF Hours)	1.40	
Maintainability	3	
AVUM + AVIM (MMH/FH)	-	

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Program Element: #6.42.20.A

DOD Mission Area: #217 - Land Warfare Surveillance
and Reconnaissance

Title: Army Helicopter Improvement Program
Budget Activity: #4 ~ Tactical Programs

SWP - Space, Weight and Power FFM - Feet per minute IRP - Intermediate Rated Power Kts - Knots MTBF - Mean Time Between Failure

AVIM - Aviation Unit Maintenance

AVIM - Aviation Unit Maintenance

AVIM - Aviation Intermediate Maintenance

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.21.A

DOD Mission: #217 - Land Warfare Surveillance and

Reconnaissance

Title: AN/UPD-7 Surveillance Systems
Budget Activity: #4-Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual	FY 1982 Estimate 3910	FY 1983 Estimate 12868	FY 1984 Estimate 11241	Additional to Completion 5930	Total Estimated Cost 33949
D208	QUANTITIES AN/UPD-7 Surveillance System	0	3910	12868	11241	5930	33949 1/

NOTE: RDTE Program will lead to the fielding of an DV-ID Detachment of six sircraft with four product-improved radar systems, two ground stations, and one set of ground support equipment.

BRIEF DESCRIPTION OF ELEMENT AND MISSION MELD: Current Army doctrine for fighting a theater war includes two major efforts: fighting the main battle and interdiction of the second echelon. Of decisive importance in the conduct of the main battle is the isolation of the battle area from outside influence through interdiction of the second echelon. This is at the Corps level. The commander must be able to detect, locate, identify, and target second-echelon forces out to beyond the forward line of troops (FLOI). The inability to delay, disrupt, or destroy second-echelon forces will allow an overwhelming force to form against our frontline units in the main battle area. The current AN/UPD-7 Surveillance System with its AN/APS-94F side-looking airborne rater (SLAR) is in accordance as significant areas and meet all the Corps Commander's needs and support successful interdiction of the second echelon. This program will product-improve the existing AN/UPD-7 Surveillance System to meet the Corps commander's moving target surveillance requirements. The AN/UPD-7() or electronically scanned (E-SCAh) program will enable the system to operate against the

Program Element: #6.42.21.A

DOD Mission: #217 - Land Warfare Surveillance and Reconnaissance

Title: Ah/UPD-7 Surveillance Systems Budget Activity: #4-Tactical Programs

threat which the current system do, will extend the surveillance range out to the required beyond the forward line of troops (FLOT), and most important, will provide continuity of surveillance by scanning the entire Corps area of influence every . The current system does not provide timely enough coverage of the Corps area of influence and adjacent flanks to insure that second-echelon forces cannot enter the main battle area . The current system does not provide timely enough coverage of the entire undetected. The continuity of surveillance provided by the product-improved AN/UPD-7 will detect second-echelon forces entering the Corps area of influence and will be used to cue shorter range, more accurate target acquisition systems such as The Battlefield Data System and PAVE MOVER as they are introduced into the force structure.

'. (U) BASIS FOR FY 1983 RDTE REQUEST:

1. (U) FY 1983 funds are required to continue Engineering Development (ED) of four prototype electronically scanned (E-SCAN) and electronic countermeasures (ECM)-hardened versions of the AN/APS-94F side-looking airborne radar, two ground sensor terminals with electronic countermeasures-hardened data links, and one set of special test equipment. The AN/UPD-7() system engineering design will be completed, and fabrication of new signal processor and scanning antennas will be initiated.

2. | Major Milestones:

2. Rajor Hilestones:	Current Milestone Dates:	Milestones Shown in FY 1982
Mini Cost and Operational	• 4	
Effectiveness Analysis	Dec 81 $\frac{1}{1}$ / Dec 81 $\frac{1}{1}$ /	Jul 81
Baseline Cost Estimate	Dec 81 $\frac{1}{-}$ /	Jul 81
Antenna Proof Of Principle		
Demonstration	Jul 81 . ,	Jul 81
h DA Engineering Development Decision	$Dec 81 \frac{1}{}$	Aug 81
Engineering Development Contract Award	May 62	Hay 82
Developmental and Operational Testing	Sep-Dec 84	Sep-Dec 64
Interim Initial Operating Capability	•	
Production Award	May 85	hay 65
Initial Operating Capability	-	

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Program Element: #6.42.21.A

DOD Mission: #217 - Land Warfare Surveillance and Reconnaissance

Title: Ah/UPD-7 Surveillance Systems
Budget Activity: #4-Tactical Programs

1/ (U) The Abbreviated Cost and Operational Effectiveness Analysis and Baseline Cost Estimate were delayed because TRADOC System Analysis Activity redirected its efforts to the Standoff Target Acquisition System (SOTAS) program. The headquarters, Department of the Army decision brief will be held when the baseline cost estimate is completed.

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1961	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
Funds (current requirements)	0	3910	12868	17171	33949
Funds (as shown in FY 1982 submission)	0	3921	13200	15400	32521

The FY 1982 and 1983 funding decrease resulted from a reprograming of funds to higher priority Army requirements.

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Aircraft Procurement, Army: Funds E-SCAN Mission Syliem						
Funds (current requirements) 1/ Funds (as shown in FY 1982	O	0	0	19600	105400	124400
submission)	0	300	15100	-	102300	117400

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Program Element: \$6.42.21.A

DOD Mission: \$217 - Land Warfare Surveillance and Reconnaissance

Title: AN/UPD-7 Surveillance Systems
Budget Activity: #4-Tactical Programs

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Funds: Aircraft Modification 2/			16900	29200	25300	71400
Quantities (current requirements)						
Data Links			0		70	70
Radars					32	32
Ground Stations					24	24
Quantities (as shown in FY 1982						
submission)						
Data Links			20		70	, 90
Radars					32	32
Ground Stations					24	24
Military Construction, Army:						
Funds (current requirements)					0	0
Funds (as shown in FY 1982 submission)					0	0

 $[\]frac{1}{2}$ Based on Department of the Army and Office of the Secretary of Defense review, the E-SCAN program was changed to allow procurement in FY 1984 through FY 1986 of 32 radars, 24 ground stations, and 5 sets of special test equipment. This provides the active force with a full capability one year sooner.

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^{2/} Aircraft modification includes conversion of OV-1B and OV-1C model sircraft into modern OV-1Ds capable of performing all required missions. Included in this modification is the purchase of aircraft survivability equipment, navigation systems, and major airframe overhaul.

Program Element: 86.42.21.A

DOD Mission: #217 - Land Warfare Surveillance and

Title: AN/UPD-7 Surveillance Systems
Budget Activity: #4-Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: In order to successfully conduct his mission of interdiction of the second echelon, the Corps Commander must be able to locate, identify, and target second-echelon forces out to beyond the forward line of troops (FLOT). The AN/UPD-7(), electronically scanned (E-SCAN), program will product-improve the current AN/UPD-7 (AN/APS-94F) Corps surveillance system to meet this requirement. The Army currently has Corps-level companies and pletacements of OV-ID, MOHAWK, aircraft fielded worldwide. The primary sensor associated with these units is the AN/UPD-7 Corps-level surveillance system, of which the AN/APS-94F side-looking airborne radar (SLAR) is the main component. This system currently provides a valuable intelligence product to field commanders on a daily basis, but does have several major The current AN/UPD-7 system requires up to one hour to cover a typical Corps front (not including Corps flamks) and has a range of only beyond the forward line of troops (FLOT). Due to this.

In addition both the AN/APS-94F radar and the data link (AN/ARC-164(V)12) that connects the airborne sensor to the ground station will be postulated to be fielded in the product-improve the existing AN/UPD-7 surveillance system to correct these time-frame. This program will and meet the Corps Commander's radar surveillance requirements. Utilizing proven technology from other development programs, the radar will be electronically of the Corps Commander's area of influence every This timely coverscanned to enable it to cover up to age will allow the Corps Commander to maintain continuity and track moving targets as they advance into the main battle area. Current aircraft (OV-ID) assets are capable of maintaining this surveillance capability hostilities and will allow the AN/UPD-7() system to cue other systems. At the same time the electronically scanned (E-SCAN) radar will be hardened to counter the opposing electronic countermeasures (ECH) threat that is postulated to exist on the European battlefield in the timeframe. This hardening will have the additional operational benefit of range of the AN/APS-94P to the range beyond the forward line of troops (FLOT) required extending the current by the Corps Commander. This program will also replace the existing AN/UPD-7 data link with an electronic countermeasure (ECh)-hardened data link to provide a total ECh-hardened Ah/UPD-7() system. Surveillance information collected from the in a ground station on a cathode ray tube (CRT) and will allow OV-1D, MOHAWK, will be displayed in software-controlled time compression of the tracks made by moving targets. The E-SCAN development (ED) program will result in enough hardware (4 radars, 2 ground stations, and one set of special test equipment) to equip an OV-1D Detachment. At the conclusion of fabrication, the AN/UPD-7() system will undergo a limited development and operational test and then be refurbished. The refurbished AN/UPD-7() hardware will then be fielded to an OV-1D Detachment in for an interim ini-The program will then transition to a limited production of hardware to tial operational capability (10C) in

Program Element: #6.42.21.A

DOD Mission: #217 - Land Warfare Surveillance and Reconnaissance

Title: AN/UPD-7 Surveillance Systems Budget Activity: #4-Tactical Programs

equip all the active Army OV-1D units. The AN/UPD-7() will have a production 10C of the decision to continue this program after the Congressional deferment of the FY 1981 funding was made only after a careful evaluation of the operational capabilities anticipated to be achieved by other developmental radar systems.

RELATED ACTIVITIES: This program is capitalizing upon the development work contained in several related programs by incorporating proven technology from them as appropriate. This approach has resulted in a low-risk development program that is largely an integration effort. The only area of the AN/UPD-7() system development assessed to have any risk is the approach to achieving an threat enviromment. This approach is technologically simple utilizing a and was proved during FY 1981 with a proof of principle demonstration. The AN/UPD-7() will utilize either the Modular Integrated Communications and Navigation System and was proved during FY 1981 with a proof

(HICKS) under development in Program Element 6.47.48.A, Standoff Target Acquisition System (SOIAS), and Program Element 6.47.30.A, Remotely Piloted Vehicle (RPV), or the L-80 Microwave Data Link developed for the

The engineering design study for the AN/UPD-7() that was accomplished in FY 1980 also took a detailed look at the Air Force PAVE MOVER and ASARS 11 developments. Some of the basic components of the AN/UPD-7() antenna will be a direct application of hardware developed in the PAVE MOVER Program. The entire design concept for the AN/UPD-7() was managed by a Study Advisory Group (SAG) composed of members from the Army Standoff Target Acquisition System (SOTAS) program, Combat Surveillance and Target Acquisition Laboratory, Program Manager for Special Electronic Mission Aircraft (SEMA), Headquarters, US Army Electronics Research and Development Command (ERADCON), and US Army Training and Doctrine Command (TRADOC). Coordination between this management group and the Air Force was accomplished through numerous visits with the PAVE HOVER and ASARS II project offices and system contractors. The primary objective of this type of continuing coordination is to insure that there is no duplication of effort within the Army or the Air Force and that the AN/UPD-7() can be rapidly developed in a low-risk, low-cost program. This integration of components developed and proven in other programs as a product improvement to an already fielded system will assure that these objectives are met. The UPD-7() ESCAN program will be coordinated with the emerging Battlefield Data Systems.

h. (U) WORK PERFORMED E7: In-House: Program Manager, Special Electronic Mission Aircraft, St. Louis, MO; US Army
Electronics Research and Development Command (ERADCCM), Adelphi, MD; Combat Surveillance and larget Acquisition Laboratory (CS&1A), Fort Monmouth, NJ. Contractors: Engineering Experiment Station, Georgia Institute of Technology, Atlanta, GA; Malibu Research Associates, Santa Monica, CA.

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Program Element: #6.42.21.A

DOD Mission: #217 - Land Warfare Surveillance and
Reconnaissance

Title: Ah/UPD-7 Surveillance Systems
Budget Activity: 44-Tactical Programs

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: During FY 1980 the Army (US Army Intelligence Center and School) developed an Organizational and Operational Concept for providing moving target surveillance of the battlefield to both Corps and Division Commanders. This concept included the complementary operation of Standoff Target Acquistion System (SOTAS) at Division Level and the AN/UPD-7() electronically scanned (E-SCAN) system at Corps level. In addition a preliminary trade-off analysis was made to determine if the Corps or Division Commander's requirements could be met solely with SOTAS or the AN/UPD-7() (E-SCAh). The initial results of this analysis clearly delineated the benefits obtained from the improved AN/UPD-7() and showed how this system and Standoff Target Acquisition System (SOTAS) perform unique functions and complement each other. In parallel with this work, an Independent Analysis was conducted that determined the baseline hardware and software configuration for the AN/UPD-7() system utilizing existing technologies from programs such as lAVE MOVER, ASARS II and SOTAS. All of these actions were reviewed at a hQDA decision briefing in November 1980. During FY 1981, the trade-off analysis accomplished in FY 1980 was expanded to an Abbreviated Cost and Operational Effectiveness Analysis (COEA) utilizing Standoff Target Acquistion System (SOTAS), ASARS-II and PAVE MOVER as baseline systems. In addition, the formal requirement for the Ah/UPD-7() electronically scanned (E-SCAN) system was updated based on a review of the requirement for targeting and target classification at both Division and Corps areas of influence

, In parallel with these initiatives, a proof-of-principle model for the recommended AN/UPD-7() radar Electronic Counter-Countermeasures (ECCh) approach was developed and tested. The results of the FY 1980 Independent Analysis indicated the entire development of the AN/UPD-7() would be of low developmental risk with the sole exception of the Electronic Counter Countermeasures (ECCh) approach which was classified as a moderate risk. The proof-of-principle demonstration limited the risk associated with this portion of the program. All of these actions will be reviewed at a hQDA decision briefing in February 1982 and a decision will be made on whether to proceed with Engineering Development with the AN/UPD-7() in FY 1962.

2. (U) FY 1962 Program: Based on the previous two years' work and a successful review of this work by HQDA in February 1982, all necessary experimental work and operational considerations will have been performed, and the AN/UPD-7 () will be ready for full-scale Engineering Development. The FY 1982 program will then initiate development of four prototype electronically scanned (E-SCAN) and Electronic Countermeasures associated versions of the AN/APS-94F side-looking airborne radar, two ground sensor terminals with associated data links, and one set of special test equipment. System engineering design will be completed, and the procurement of long lead items will be completed to support fabrication in FY 1982.

Program Element: #6.42.21.A DOD Mission: #217 - Land Warfare Surveillance and Reconnaissance

Title: AN/UPD-7 Surveillance Systems Budget Activity: #4-Tactical Programs

- 3. (U) FY 1983 Planned Program: Based on the engineering design completed in FY 1982, the hardware modifications to the AN/UPD-7 (APS-94F) will be initiated. These will include the development and fabrication of the new electronic scanned antenna and the ground sensor terminal.
- 4. (U) FY 1984 Planned Program: Continues fabrication and assembly of the engineering development models, performance, bench and flight testing. These will include verification and validation of software for operation of the ground station. A limited development test is also scheduled. Logistics support including spare parts and training for testing will be procured.
- 5. Program to Completion: Engineering development will be completed during the fourth quarter of FY 1984 with the subsequent fielding of the engineering development hardware to an OV-1D detachment in

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.42.22.A

DOD Mission Area: #372 - Escort, Standoff, and
Counter C.

Title: Joint Service Rotary Wing Aircraft Development
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	0	0	49765	77290	TBD	TBD
D211	JVX-Joint Services Advanced Vertical Lift Aircraft Development Program	0	0	49765	77290	TBD	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Service requirements exist for the development of a vertical medium-lift category of aircraft for the 1990s. This program element will provide the engineering development necessary to develop through a joint service program an advanced vertical lift aircraft capable of performing as: The Army's platform for its airborne intelligence and electronic warfare (IEW) mission; the Marine Corps' primary rotary-wing aircraft for medium-lift assault; the Air Force's combat search/rescue and special operations (SAR/SOF) mission aircraft; and the davy platform for various missions including antisubmarine warfare (ASW), search and rescue, vertical onboard delivery (VOD), carrier onboard delivery (COD), and airborne early warning. The objectives of this joint program are to: (a) Acquire an advanced technology vertical lift vehicle capable of meeting common Service requirements while providing Service-unique mission equipment packages where appropriate; (b) achieve a substantial increase in speed and range over current aircraft used in these roles, while retaining essential vertical lift characteristics sufficient to meet Service mission requirements; (c) reduce Department of Defense (DOD) program cost through pursuit of a joint development project for a common air vehicle; and (d) achieve the earliest possible Initial Operational Capability (IOC) consistent with good management and prudent program risks.

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Program Element: # 6.42.22.A

DOD Mission Area: #372 - Escort, Standoff, and
Counter C3

Title: Joint Service Rotary Wing Aircraft Development Budget Activity: 14 - Tactical Programs 11

C. (U) BASIS FOR FY 1983 RDTE REQUEST: The Army is the Executive Service for this joint program and will carry all RDTE funding required for its management and execution within its own budget. All development funding will be carried under subject program element and project. The funds requested in FY 1983 will be used to complete concept validation/demonstration and to initiate full-scale development of the Joint Rotary Wing Aircraft.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Joint Required Operational Capability (JROC) Approved	3QFY82	Not Shown
System Concept and Joint Defense Systems Acquisition Review Council (JDSARC)	4QFY83	Concept Definition Studies and Program Nanagement Initiated in FY 1982. Full-Scale Development Program Initiated in FY 1983.
Preliminary Design Review	4QFY84	Not Shown
100	3QFY92	Not Shown

- D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands) Full-scale engineering development as a new start initiated in FY 1983.
- E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

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Program Element: \$ 6.42.22.A

DOD Mission Area: \$372 - Escort, Standoff, and

Counter C3

Title: Joint Service Rotary Wing Aircraft Development
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This effort supports a single full-scale engineering development program to mature vertical lift technology for all Services. It will provide the bridge between technology demonstrators (such as the tilt rotor, advancing blade concept, tilt nacelle, etc.), allow the application of current generic technology, and provide a vehicle that will dramatically enhance specified Service mission capabilities. Mission requirements include Army corps—level intelligence—gathering, Air Force combat rescue and special operations capability, additional range endurance and payload to meet the Navy's ASW and Marine Corps' assault transport missions. These missions must be accomplished within acceptable risk levels in the face of projected threats anticipated in the 1990's to 2000 timeframe.
- G. (U) RELATED ACTIVITIES: Individual Service program concept and formulation efforts have been conducted under various program elements to include 6.32.22.A, Special Electronic Mission Aircraft (SEMA), and 6.42.62.N, Helicopter-Medium Lift (HMX), with current Army-applicable generic technology under 6.32.01.A (Propulsion) and 6.32.11.A (Rotors, Flight Controls and Structures).
- B. (U) WORK PERFORMED BY: Under the Ex. 'ive Direction of the US Army, the work performed under this program element is expected to be the responsibility of the US Army's Aviation Research and Development Command (AVRADCOM) in St. Louis, Missouri, under the suspices of the US Army's Hateriel Development and Readiness Command (DARCOM) in Alexandria, Virginia. As required, specific tasks will be performed by representatives from field activities of the Army, Navy, Marine Corps, and Air Force.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 1981 and Prior Accomplishments: Not Applicable.
- 2. (U) FY 1982 Program: Army, Navy, Air Force, Marine Corps joint working group complete technology assessment, develop a Memorandum of Understanding (MOU), Joint Requirements Document (JROC), Program Management Charter, and essential development/acquisition plans including Milestone I system concept paper and draft request for proposals from industry.
- 3. (U) FY 1983 Planned Program: In FY 1983, evaluate RFP, fully staff PMO, and complete concept validation and initiate full-scale engineering development to include contract award.

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Program Element: \$ 6.42.22.A

DOD Mission Area: \$372 - Escort, Standoff, and

Counter C3

Title: Joint Service Rotary Wing Aircraft Development
Budget Activity: #4 - Tactical Programs

- 4. (U) FY 1984 Plan ed Program: Full-scale engineering development will continue.
- 5. (U) Program to Completion: Full-scale engineering development to continue in FY 1985 with Initial Operational Capability (10C) in FY 1992.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.68.A

DOD Mission Area: #218 - Land Warfare Associated

Air Mobility

Title: Component Improvement Program

Budget Activity: 14 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	8579	11609	10996	17635	Continuing	Not Applicable
D106	Component Improvement Program	8579	11609	10996	17635	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Army needs for its fleet of helicopters the best possible engines and the ability to keep them operationally available throughout their life cycles. This program provides, through engineering development support, essential improvements in current inventory sircraft engine servicesbility encompassing the areas of flight safety, reliability, maintainability, durability (improved parts, maintenance techniques, increased overhaul intervals, modifications, etc.) and the correction of service-revealed deficiencies. This effort is essential to increase the time between overhauls, foster a general reduction in maintenance man-hours and resources required to sustain sircraft engines in tactical service, and ultimately substantially reduce overall life cycle costs. The engine Component Improvement Program (CIP) provides a continuing engineering base for the efficient resolution of Service-Revealed Difficulties (SRD) arising from current field use, special operations such as operation "Bright Star," or other difficulties anticipated during future field use or special operations of all inventory engines.

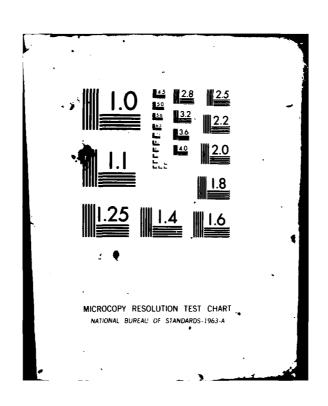
C. (U) BASIS FOR FY 1983 RDTE REQUEST:

1. (U) T700-GE-700: The T700 engine is qualified and in production for the UH-60A BLACK HAWK helicopter and a derivative, the T700-GE-700, is included in the Army AH-64 Advanced Attack Helicopter (Apache) program. The engine has been extremely successful, and the service-revealed difficulties that have been encountered have been quickly resolved. As a result of the ongoing T700 Component Improvement Program (CIP), significant improvements have been made in reliability, maintainability, and in an estimated \$130 million cost-avoidance in both acquisition and life cycle costs. The requested funds in FY 1983 will permit continuing this program of engineering support and test of critical components and engine accessories during the early production phases to maintain this continued success. It will also provide solutions to any

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Program Element: #6.42.68.A

DOD Mission Area: #218 - Land Warfare Associated

Air Mobility

Title: Component Improvement Program

Budget Activity: #4 - Tactical Programs

potential problems encountered in the newly developed (10-percent growth) T701 engine. Continuing improvements in both engines 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.

- 2. (U) T55-L-712: This T55 engine version used in the CH-47D (Modernization Aircraft) and in a limit d number of CH-47C models 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 of modified engine fielding. The funds requested in FY 1983 will permit continuing support of this effort as well as performance of extended service life and endurance testing to resolve any reliability, maintainability, and manufacturing problems that appear during the fabrication of further engine modification kits.
- 3. (U) The T700 and T55 Component Improvement Programs are extremely cost effective in that problems have been and will continue to be 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 1982 RDTE REQUEST: (\$ in thousands)

RDTE	PY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
Funds (current requirements)	8579	11609	10996	Continuing	Not Applicable
Funds (as shown in FY 1982 subwission)	8859	11644	12223	Continuing	Not Applicable

PY 1980 Defense Appropriation Bill transferred the Component Improvement Program funds from the Procurement Appropriation to the RDTE account. The difference in FY 1981 funds is due to reprograming to higher priority Army requirements. The differences in funds shown in FY 1982 and FY 1983 are the result of internal reprograming to higher priority Army programs.

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

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Program Element: #6.42.68.A

DOD Mission Area: #218 - Land Warfare Associated

Alr Hobility

Title: Component Improvement Program
Budget Activity: #4 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: 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 existing 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, forewarms logisticisms of spare part requirements, and prevents secondary damage to the engine and aircraft by scheduling removal of a part prior to reaching its service 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 fuel efficiency, emergency fuels, and new engine operating environments such as in desert operations.
- 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 Program Managers for UH-60A BLACK HAWK, AH-64 Advanced Attack Helicopter, (Apache) and CH-47 Modernization. Price contractors involved in support of this project include AVCO-Lycoming Company of Stratford, CT, (T55-L-712) and the General Electric Company, Lynn, MA (T-700/701). 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 1981 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 engine mounting bracket, improved engine bellows, and a new came device in the hydromechanical

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Program Element: #6.42.68.A

DOD Mission Area: #218 - Land Warfare Associated

Air Mobility

Title: Component Improvement Program

Budget Activity: #4 - Tactical Programa

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 T55 engine are directed towards maintaining the predicted Mean Time Between Depot Removal of all Causes (MTBDRA) of 1150 hours and a Mean Allowable Operating Time (MAOT) of 2400 hours. These efforts have been underway since FY 1976. Although the T55-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, 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, an improved lubrication pump and power turbine bearing package, and significant fuel control improvements.

- 2. (U) FY 1982 Program: T700-GE-700: Tasks include redesign of the stage 1 and 2 turbine wheels for improved Low Cycle Fatigue (LCF) life; #4 bearing improvement investigations for increased life, and increased life investigations for the power take-off duplex bearing. Accelerated mission testing will continue but at a reduced rate.
- (U) T700-GE-701: A Component Improvement program will be initiated to solve, through engineering development, any long-term reliability and durability problems caused by higher 701 engine termperatures and/or the AH-64 Advanced Attack helicopter (APACHE) mission and engine installation.
- (U) T55: The FY 1982 efforts include compressor performance improvements, leakage reduction, improved chip detector, fuel control remote sensor and bleed bland control switch, and development of an engine dynamic simulation model. These efforts will supplement those executed in FY 1981.
- 3. (U) FY 1983 Planned Program: Tasks will include solving unique T700-GE-701 (10-percent growth) engine problems which become apparent and require support due to service-revealed deficiencies. T700 accelerated mission testing will continue. T55 accelerated mission testing and contractor engineering analysis will continue. Additionally in FY 1983, efforts will be initiated to provide a component improvement program for improving T53 fuel efficiency and inlet sand erosion problems associated with missions in desert environments such as discovered in operation "Eright Star."
- 4. (U) FY 1984 Planned Program: On T700-GE-700, 701, and T55: continuation of engine mission testing is planned for support of engineering problems and service-revealed deficiencies through development, design, test, and qualification. T53

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Program Element: #6.42.68.A

DOD Mission Area: #218 - Land Warfare Associated

Air Mobility

Title: Component Improvement Program

Budget Activity: #4 - Tactical Programs

fuel efficiency and inlet sand erosion problems initiated in FY 1983 to counter deficiencies discovered in operation "Bright Star" will continue to completion. The increase in funding for project DIO6 from FY 1983 to FY 1984 is due principally to this being the first full year of funding for the T53 CIP effort and a \$3.5 million increase in the T700/701 effort to include 2000 hours of accelerated mission tests.

5. (U) Program to Completion: This is a continuous effort.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.06.A DOD Mission Area: 1222 - Ground Based Antiair and Title: STINGER

Budget Activity: #4 - Tactical Programs

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

Tactical Missile Defense

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1981 Actual 5657	PY 1982 Estimate 16121	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost 216987	
	QUANTITIES						205	
D646	Stinger	5657	16121	0	0	0	216987	

BRIEF DESCRIPTION OF PROJECT: This program provides for full-scale development of a Manportable A'r Defense Weapon System (MANPADS). MANPADS is a self-defense, air defense vespon system needed at the company unit level to counter enemy low-altitude, high-speed tactical sircraft and helicopter threats to company-size units operating near the Furward Edge of the Battle Area (FEBA). Stinger has been designed as the MANPADS to replace the current Redeye system, which has no forward aspect engagement capability and no Identification, Friend or Foe (IFF) system. Engineering Development (ED) of the basic Stinger system was completed with FY 1978 funds. While Stinger has the capability to overcome some infrared countermes-An advanced seeker, Passive Optical Seeker Technique (POST), was approved for engineering development in June 1977 to significantly improve Stinger's infrared counter-countermeasures capability.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: The FY 1982 President's Budget, as smended (March 1981), provided the resources to complete Stinger-Post engineering development in FY 1982. Thus, the \$4.5 million originally requested for FY 1983 is not required.

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SURMARY

Program Element: #6.43.07.A

#222 - Ground-Based Antiair and Tactical Missile Defense DOD Mission Area:

Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Total Additional Estimated To Completion Costs
	TOTAL FOR PROGRAM ELEMENT	75362	57812	47076	86076	To Be Determined
D212	Patriot (SAM-D)	56695	27885	15873	63415	To Be Determined
D213	Patriot (ECCM Enhancement)	16573	27971	27477	15879	To Be Determined
D291	Patriot (NATO)	2094	1956	3726	6782	To Be Determined

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Air defense for the field Army requires high- and medium-altitude air defense capable of reacting to the massive air raids expected in a conflict. In the field Army Patriot defenses will be complemented by short-range, low-altitude forward area air defense weapons and will be integrated with the US Air Force in the overall air defense of the theater of operations. Patriot is an advanced surface-to-air guided missile system with a high single-shot kill probability capable of operation in an Electronic Countermeasures (ECM) environment, and able to conduct multiple simultaneous engagements against the high-performance air-breathing targets likely to be encountered by deployed United States forces during the 1980's and beyond. To cope with the projected threat, Patriot will utilize a trainable, multifunction, electronically scanned phased array radar. In addition, a digital computer will be used to automatically control the system functions and provide the operator, through various displays, the ability to control and monitor operations. The guidance system combines command guidance and homing guidance (track-via-missile (TVM)) systems. Patriot (Project Number D291) is being considered by European nations as their future surface-to-air missile system. Six European NATO Nations have signed a Memorandum of Understanding with the US which established a NATO Patriot Steering

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Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

Committee (PSC) and a full-time management study group for the period Oct 78-Oct 81 to study the acquisition of Patriot by these nations. Patriot Electronic Counter-Countermeasures (ECCM) Enhancement (Project Number D213) has been initiated upon recommendations of the Defense Science Board

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

(U) Project D212 - Funds are required to develop program test sets (PTS) for Patriot Battery Replaceable Units (BRU's) selected for repair at a Government-operated depot. PTS's are required to adapt BRU's to the selected Automatic Test Equipment (ATE) and include the software and procedures to test and repair the BRU's. The ATE will be a standard item of equipment (such as EQUATE AN/USM-410) provided one meets the technical requirements of the Patriot System BRU's. This effort was begun in FY82 and will continue through FY85. This RDTE request also includes publication of the Patriot System BRU's. This effort was begun in FY82 and will continue through FY85. This RDTE request also includes publication of the Patriot Department of the Army Technical Manuals (DATM's). This will be the final year of an effort which began in FY81. These funds are required to complete the initial publication of Patriot DATM's needed to support the fielding of the Patriot System. Continue Engineering Development effort which was initiated in FY82 for the low-cost ARM Decoy for the Patriot System.

Project D213 - Initiate task to accomplish the surveillance, guidance, and armament functions to conventional warheads than Patriot was designed to counter. Continue testing and qualifying the hardware and software changes resulting from previously initiated enhancements in the following areas:

1, __

Program Element: #6.43.07.A DOD Mission Area: #222 - Ground-Based Antiair and Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

Project D291 - Continuation of ongoing technical/menagement requirements to support NATO acquisition efforts.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Completion of DT/OT Testing	Aug 80	Aug 80
Limited Production Decision DSARC III	Sep 80	Sep 80
Completion of Prototype System**	N/A	Oct 81
Confirmation Test**	Aug 83	
Delivery of 1st Production Fire Unit*	Apr 82	Feb 82
First Battalion (FORSCOM) Activation	Mar 83	May 82
Complete Production Confirmation Test*** First Battalion (USAREUR) IOC	Dec 82	Sep 82

- * Three-month slip in delivery of first production fire unit has caused a corresponding slip in activation and test completion.

 ** - No production prototypes are planned.

 ** - No production prototypes are planned.
- *** Completion of Unit 1, Unit 2, and Unit 3 using ED Sets (Oct 81); Unit 4 using production sets (Aug 83).
 **** PCT is equivalent to Patriot's Component Design Confirmation/System Design Confirmation (CDC/SDC).

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

Tactical Missile Defense

.	PY 1981	FY 1982	FY 1983	FY 1984	Additional To Completion	Total Estimated Cost
RDTE Funds (current submission)	75362	57812	47076	86076	Continuing	Not Applicable
Funds (as shown in FY 1982 submission)	75375	57991	To Be Det	termined	Continuing	Not Applicable

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

Note: Differences in FY81 and FY82 are due in inflation adjustments.

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

Missile Procurement, Army Funds (current requirement) Funds (as shown in FY 1982 submission)	FY 1981 Actual 442300 442300	FY 1982 <u>Estimate</u> 675600 1/ 820800	FY 1983 <u>Estimate</u> 805100 1/ Not Shown	FY 1984 Estimate 965200 Now Shown	Additional To Completion 4450800 Not Shown	Total Estimated Costs 7802100 Not Shown
Quantities (current requirement) Fire Control Sections Missiles	5 130	9 <u>1</u> / 176	12 376	18 664	54 4754	103 6217
Quantities (as shown in FY 1982 submission) Fire Control Section Missiles	5 130	12 364	Not Shown Not Shown			
Military Construction, Army Funds (current requirement) Funds (as shown in FY 1982 submission)	0 0	32231 4220 0	48660 66004	66507 Not Shown	141342 214048	288740 <u>2</u> / 322252

^{1/} FY82 dollars reduced furing FY82 budget decrements and Congressional action.

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^{2/} NATO Infrastructure Funds will also be used for contruction of operating facilities in USAREUR. Cost reduction caused by change in exchange rates in Europe.

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: Patriot (SAM-D)
Budget Activity: 44 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: Patriot will replace NIKE HERCULES and Improved HANK. Deployment of the Patriot system will reduce manpower and logistical costs and provide an improved Army air defense. In the field Army Patriot defenses will be complemented by short-range, low-altitude forward area air defense weapons and will be integrated with the US Air Force in the overall air defense of the theater of operations. The advanced features of Patriot will provide an increased capability against saturation attacks, electronic countermeasures (ECM) and maneuvering targets. Patriot is an advanced surface-to-air guided missile system with a high single-shot kill probability capable of operation in an ECM environment, and able to conduct multiple simultaneous engagements against the high-performance air-breathing targets likely to be encountered by deployed United States forces during the 1980's and beyond. To cope with the projected threat Patriot will utilize a trainable multifunction, electronically scanned phased array radar. In addition, a digital computer will be used to automatically control the system functions and provide the operator, through various displays, the ability to control and monitor operations. The guidance system combines command guidance and homing guidance (track-via-missile (TVM)) systems.
- G. (U) RELATED ACTIVITIES: System commonality with the Navy AEGIS has been studied and although separate developments are required, continuous coordination insures the use of common components whenever feasible. The Patriot system, through the battalion, will be interoperable with other Army Group/Brigade-level command and control systems through the Army Air Defense Command and Control System (AN-TSO-73). It will also be interoperable with the Air Force or Marine Corps systems when the Group/Brigade-level AN/TSO-73 is not available.
- H. (U) WORK PERFORMED BY: The Raytheon Company at Bedford, MA, is prime contractor with Martin Marietta Corporation of Orlando, FL, as missile subcontractor. Thickol Chemical Corporation of Huntsville, AL, is a subcontractor for the rocket motor. Teledyne Brown, Huntsville, AL, is the Software Verification and Validation contractor; Science Applications Incorporated, Huntsville, AL, has developed a Tactical Operation Simulator (TOS); Sanders Associates, Nashua, NH, has developed an Operator/Tactics Trainer (OTT). Government agency in-house work is managed by the Patriot Project Management Office, Huntsville, AL.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1981 and Prior Accomplishments: The project was initiated as the Army Air Defense System for the 1970's (AADS-70's) in 1963. The program was renamed surface-to-air missile development (SAM-D) in FY 1965. Contract Definition

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Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

was completed, and a contract for Advanced Development (AD) was swarded in May 1967. SAM-D hardware was designed, fabricated, and tested in the Advanced Development program. This program proved the ability of the multifunction phased array radar to carry out time-shared search and track functions under computer control. As a result of the successful completion of Advanced Development objectives, SAM-D was approved for entry into Engineering Development (ED) in March 1972. The SAM-D Nuclear and Antimissile Capability Study, approved in December 1972, recommended: delection of the nuclear warhead, programing of reduced number of fire sections for Continental United States (CONUS) air defense, and development of an improved nonnuclear warhead. After another year of ED, the program was reoriented on 10 January 1974 to emphasize greater austerity while permitting early flight verification of the track-vis-missile guidance principle. A stop-work order was issued to the prime contractor on 4 February 1974. As a result of this order, all effort in support of a major portion of the hardware development and some engineering activities were deferred until a Defense Systems Acquisition Review Council (DSARC) met to approve the reoriented program. Ongoing efforts remaining after the stop-work order were in support of the Track-Via-Hissile (TVM) demonstration and an austere development program. The DSARC met on 6 June 1974, and the Deputy Secretary of Defense directed program efforts continued in the following areas: preparation for the TVM demonstration flights, continuation of the austere development program, initiation of cost reduction efforts, development of a backup guidance. Control Test Vehicle (CTV) flights were successfully completed on 28 August 1974. The major objectives of the captive carry flight test program, a prerequisite beginning the Engineering Development Model flights, were successfully demonstrated and repeated during November 1974. Proof-of-Principle flight tests demonstrated through missile firings that TVM guidance functions were successful against various targets. An Army Systems Acquisition Review Council (ASARC) held in January 1976 directed the resumption of Full-Scale Engineering Development. The Surface-to-Air Missile Development (SAM-D) program was officially named Patriot on 21 May 1976. On 4 August 1976 a contract to complete the contracto portion of the Patriot system development was awarded to Raytheon Company. The Patriot Missile System Flight program was caumed on 2 December 1976 at White Sands Missile Range (WSMR) with a firing using the tactical prototype Fire Unit (FU-1). The contractor test program from 2 December 1976 to 16 January 1980 completed 36 missile firings. A special ASARC decision was made on 17 February 1977 to accelerate the Engineering Development (ED) program. PU-3, -4, -5 were used at WSMR for training, support, and DT/OT II Tests during PY80. Nine DT II firings and nine OT II firings were conducted from 22 August 1979 to 21 July 1980. Results of these tests were used to support the DSARC III production decision. As required by SECDEF memo, 10 September 1980, the Patriot verification program unit test was initiated with Unit 1, operational and diagnostic software checkout; Unit 2 large-scale search track, software endurance, and missile firings; and Unit 3 Reliability, Availability, Maintainability (RAM) demonstration and missile firings. For Units 1, 2, and 3, seven firings were conducted from 11 June 1981 to 10 August 1981. The contract period of performance has been extended to March 1981 to include

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Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: Patriot (SAM-D)
Budget Activity: 84 - Tactical Programs

producibility engineering and planning (PEP), the Counter-Antiradition Missile (ARM) Program, Maintenance Enhancement Program (MEP), and ECCM enhancement. The Initial Production Facility (IPF) Buy 3 was awarded in March 1981. Current planning includes IPF Buy 4 and IPF Buy 5. The first three IPF buys established the initial production lines with a limited throughput for Missiles and Ground Support Equipment. IPF Buy 4 includes tools and test equipment to establish a ramp-up missile, and Buy 5 is planned to provide tools and test equipment for the second ramp in missile production and to maximize the production capability as originally designed. Following DSARC III, SECDEF authorized Patriot to begin limited production. The production program was initiated on 1 October 1980. The first contract is for 5 fire units, 117 missiles, and other associated support equipment. The second contract was initiated on 28 August 1981 for 5 fire units, 130 missiles, and other associated support equipment.

- 2. (U) FY 981 Program: Complete RAM demonstration portion of Unit 3 test. Establish diagnostics improvement program; initiate firs: battalion individual training. First production sets will be delivered with three sets of tactical hardware being used to form the first tactical half-battalion which will be activiated at Ft. Bliss, TX, as a training unit. Testing of maintenance diagnostic software will continue, and development of maintenance support test equipment will begin.
- 3. (U) FY 1982 Program: Complete Unit 4 Tests Follow-on Evaluation (FOE), deliver deployment software build, establish Army training base, receive conditional material release approval and begin provisioning of first half-battalion for Europe. Development and testing of maintenance support equipment and improvement of maintenance diagnostic software will continue.
- 4. FY 1983 Planned Program: Complete training for first half-battalion with deployment in Eurpope planned for ; complete system environmental qualifications with production hardware, continue post-deployment software program, continue system tests with ECCM enhancement improvements, diagnostics improvement program completed. Continue system ECCM enhancements for incorporation into planned production schedules. Initiate development of several major product improvements which will provide the system with added capabilities to counter the and also will provide improved reliability and maintainability.
- 5. Program to Completion: The US will assist in the development of cooperative programs with NATO and other US allies. Production contracts will be executed until the currently programed number of fire units are completed. Continue the development of several major product improvements. These improvements will provide the system with added capabilities

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D212

Program Element: #6.43.37.A

DOD Mission Area: 122 - Ground-Based Antiair and Tactical Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)

Budget Activity: #4 - Tactical Programs

A. (U) DETAILED BACKGROUND AND DESCRIPTION: Patriot will replace NIKE HERCULES and Improved HAWK. Deployment of the Patriot system will reduce manpower and logistical costs and provide an improved Army air defense. In the field Army Patriot defenses will be complemented by short-range, low-altitude forward area air defense weapons and will be integrated with the US Air Force in the overall air defense of the theater of operations. The advanced features of Patriot will provide an increased capability against saturation attacks, electronics countermeasures (ECM), and maneuvering targets. Patriot is an advanced surface-to-air guided missile system with a high single-shot kill probability capable of operation in an ECM environment, and able to conduct multiple simultaneous engagements against the high-performance air-breathing targets likely to be encountered by deployed United States forces during the 1980's and beyond. To cope with the projected threat, Patriot will utilize a trainable, multifunction, electronically scanned phased array radar. In addition, a digital computer will be used to automatically control the system functions and provide the operator, through various displays, the ability to control and monitor operations. The guidance system combines command guidance and homing guidance into a track-via-missile (TVM) system.

- B. (U) RELATED ACTIVITIES: System commonality with the Navy AEGIS has been studied and although separate developments are required, continuous coordination insures the use of common components whenever feasible. The Patriot system, through the Battalion, will be interoperable with other Army Group/Brigade-level command and control systems through the Army Air Defense Command and Control System (AN/TSO-73). It will also be interoperable with the Air Force or Marine systems when the Group/Brigade-level AN/TSO-73 is not available.
- C. (U) WORK PERFORMED BY: The Raytheon Company at Bedford, MA, is prime contractor with Martin Marietta Corporation of Orlando, FL, as missile subcontractor. Thiokol Chemical Corporation of Huntsville, AL, is a subcontractor for the rocket motor. Teledyne Brown, Huntsville, AL, is the Software Verification and Validation contractor; Science Applications

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Project: #D212

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground Based Antiair and Tactical Missile Defense

Title: Patriot (SAM-D) Title: Patriot (SAM-D)

Budget Activity: #4 - Tactical Programs

Incorporated, Huntsville, AL, has developed a Tactical Operation Simulator (TOS); Sanders Associates, Nashua, NH, has developed and is producing an Operator/Tactics Trainer (OTT). Government agency in-house work is managed by the Patriot Project Management Office, Huntsville, Al.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The project was initiated as the Army Air Defense System for the 1970's (AADS-70's) in 1963. The program was changed and renamed Surface-to-Air Missile Development (SAM-D) in FY 1965. Contract definition was completed, and a contract for Advanced Development (AD) was awarded in May 1967. SAM-D hardware was designed fabricated, and tested in the Advanced Development program. This program proved the ability of the multifunction phased array radar to carry out time-shared search and track functions under computer control. As a result of the successful completion of Advanced Development objectives, Patriot (formerly SAM-D) was approved for entry into Engineering Development (ED) in March 1972. The SAM-D Nuclear and Antimissile Capability Study, approved in December 1972, recommended: deletion of the nuclear warhead; programing a reduced number of fire sections for Continental United States (CONUS) air defense; development of an improved nonnuclear warhead. After another year of ED, the program was reoriented on 10 January 1974 to emphasize greater austerity while permitting early flight verification of the track-via-missile (TVM) guidance principle. A stop-work order was issued to the prime contractor on 4 February 1974. As a result of this order, all effort in support of a major portion of the hardware development and some engineering activities were deferred until a Defense Systems Acquisition Review Council (DSARC) met to approve the recriented program. Ongoing efforts remaining after the stop-work order were in support of the TVH demonstration and an austere development program. The DSARC met on 6 June 1974, and the Deputy Secretary of Defense directed program efforts continue in the following areas: preparation for the TVM demonstration flights; continuation of the austere development program; initiation of cost reduction efforts; development of a backup guidance. Control Test Vehicle (CTV) flights were successfully completed on 28 August 1974. The major objectives of the captive carry flight test program, a prerequisite to beginning the Engineering Development Missile flights, were successfully demonstrated and repeated during November 1974. Proof-of-Principle flight tests demonstrated through missile firings that TVM guidance functions were successful against various types of targets. An Army Systems Acquisition Review Council (ASARC) held in January 1976 directed the resumption of full-scale Engineering Development. The Surface-to-Air Missile Development (SAM-D) program was officially named Patriot on 21 May 1976. On 4 August 1976 a contract to complete the

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Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground Based Antiair and

Tactical Missile Defense

Title: Patriot (SAM-D) Title: Patriot (SAM-D)

Budget Activity: #4 - Tactical Programs

contractor portion of the Patriot system development was awarded to Raytheon Company. The Patriot Missile System Flight program was resumed on 2 December 1976 at White Sands Missile Range (WSMR) with a firing using the tactical prototype Fire Unit (FU-1). A special ASARC decision was made on 17 February 1977 to accelerate the Engineering Development (ED) Program. The contractor test program from 2 Dec 76 to 16 Jun 80 has completed thirty-six missile firings. FU-3, -4, and -5 were used at White Sands Missile Range (WSMR) for training, support, and DT /OT II during FY80. Nine DT II firings and nine OT II firings were conducted from 22 Aug 79 to 21 Jul 80. Results of these tests were used to support the DSARC III Production decision. As required by the SECDEF memo, 10 September 1980, the Patriot Verification Program Unit Test was initiated with Unit 1, Operational and Diagnostic software checkout; Unit 2, large-scale search track, software endurance, and missile firings; and Unit 3, RAM demonstration and missile firings. For Units 1, 2, and 3, seven firings were conducted from 8 June 1981 to 10 August 1981. The contract period of performance has been extended to December 1982 to include producibility engineering and planning (PEP), the counter-Antiradiation Missile (ARM) Program, Maintenance Enhancement Program (MEP), and ECCH Enhancement (D213) Tasks. The PEP contract was initiated in Oct 77 to produce the manufacturing data package, to complete quality assurance plans, and to design special tooling and special test equipment necessary to go into the production plase. The initial production facilities (IPF) contract was signed Mar 79 to purchase long-lead special tooling and special test equipment necessary to support a decision on the Patriot Program in FY 1980. (n 10 Sep 80 the SECDEF Decision Memorandum was signed authorizing limited production of Patriot.

- 2. (U) FY 1982 Program: Complete RAM demonstration portion of Unit 3 test. Establish diagnostics improvement program; initiate first BN individual training. First production sets will be delivered with three sets of tactical hardware being used to form the first tactical half-battalion which will be activated at Ft. Bliss, TX, as a training unit. Testing of maintenance diagnostic software will continue, and development of maintenance support test equipment will begin.
- 3. (U) FY 1983 Planned Program: Complete Unit 4 Tests (FOE), deliver deployment software build, establish Army training base, receive conditional material release approval and begin provisioning of first half-battalion for Europe. Development and testing of maintenance support equipment and improvement of maintenance diagnostic software will continue.
 - FY 1984 Planned Program: Complete training for first half-battalion with deployment in Europe planned for , complete system environmental qualifications with production hardware, continue post-deployment software

Program Element: #6.43.07.A

DOD Mission Ares: #222 - Ground Based Antiair and Tactical Missile Defense

Title: Patriot (SAM-D)

Title: Patriot (SAM-D)
Budget Activity: 84 - Tactical Programs

program, continue system tests with ECCM enhancement improvements; diagnostics improvement program completed. Continue system ECCM enhancements for incorporation into planned production schedules. Initiate development of several major product improvements which will provide the system with added capabilities to counter the and also will provide improved reliability and maintainability.

5. Program To Completion: Production contracts will be executed until the currently programed number of fire units are completed. Continue the development of several major product improvements. These improvements will provide the system with added capabilities to counter the

Major Milestones:

	Current	Milestone Dates			
Major Milestones	Milestone Dates	Shown in FY 1982 Submission			
Completion of DT/OT Testing	Aug 80	Aug 80			
Limited Production Decision DSARC 111	Sep 80	Sep 80			
Completion of Prototype System**	N/A	Oct 81			
Confirmation Test**	Aug 83				
Delivery of lst.Production Fire Unit	Apr 82	Feb 82			
First Battalion (FORSCOM) Activation	Jan 83	May 82			
Complete Production Confirmation Test***	Dec 82	Sep 82			
First Battalion (USAREUR) IOC					

^{**} No production prototypes are planned.

Project: #D212
Program Element: #6.43.07.A

DOD Mission Ares: #222 - Ground Based Antizir and
Tactical Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

*** Completion of Unit 1, Unit 2, and Unit 3 Testing using ED sets (Oct 81); Unit 4 Testing using production sets (Aug 83).

**** The Production Confirmation Test is equivalent to Patriot's Component Design Confirmation/System Design Confirmation

Note: Milestones for delivery of first production units and activation of first battalions have been slipp d due to production start-up delays.

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

ROTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1982	56695	27885	15873	63415	TBD	To Be Determined
submission)	53074	27972	To	Be Determine	ed	To Be Determined

Project: #D212
Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground Based Antiair and
Tactical Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

Note: Differences in FY81 and 82 are due	to inflation	adjustments	and internal	reprogrami:	ng.	Waa - 1
	FY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	PY 1984 Estimate	Additional To Completion	Total Estimate Cost
Quantities (current requirements) Quantities (as shown in FY 1982 submission)	Not Applic					
Other Appropriations:						
Missile Procurement, Army:						
Fund (current requirements)	442300	675600	805100	965200	4450800	7802100
Funds (as shown in FY 1982 submission)	442300 ¹	820800 ¹	9022001	Not Shown	3340900 ²	5902150 ²
Quantities (current requirements)						
Pire Control Sections (FCS)	5	9	12	18	54	103
Missiles	130	176	376	664	4754	6217
Quantities (as shown in FY 1982 submission)						
Fire Control Sections (FCS)	12	18	Not Shown		63	103
Missiles	183	391	Not Shown		3197	6217

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Project: #D212
Program Element: #6.43.07.A
DOD Mission Area: #222 - Ground Based Antiair and
Tactical Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: 74 - Tactical Programs

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimate Cost
Military Construction, Army(MCA) Funds (current requirements) Funds (as shown in FY 1982	0	32231 <u>3</u> /	48660 3/	66507	141342 <u>3</u> /	288740 <u>3</u> /
submission)	0	42200	66004	Not Shown	214048	322252

Cost increases caused by reduced production rate for FY81 and 82, OSD-directed test program for FY81 and 82, and revised production cost estimates from negotiation of FY80 production contract.

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Reductions in production quantities directed by OSD in SECDEF Decision Memo from DSARC III, 10 September 1980.

Decreases in Military Construction, Army (MCA) are caused by improved exchange rates in Germany where operational and support facilities are required for deployment of Patriot to US Army Europe (USAREUR) and US Army Forces Command (PORSCOM). NATO Infrastructure Funds will also be used for construction of operating facilities in USAREUR.

Project: #D212

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical
Missile Defense

Title: Patriot (SAM-D)

Title: Patriot (SAN-D)
Budget Activity: #4 - Tactical Programa

E. (U) TEST AND EVALUATION DATA:

1. (U) General:

- a. (U) The Patriot System (known as Surface-to-Air Missile Development (SAM-D) until 1976) was conceived in the early 1960'S. Conceptual designs were evaluated from two contractors with Raytheon selected to continue with concept definition. The multifunction phased array radar concept was investigated until 1967 when a Milestone I decision was made to enter Advanced Development (AD). The AD contract was awarded to Raytheon Company in May 1967. AD defined a low-risk engineering development (ED) program by demonstrating: the performance of the multifunction aspects of Patriot; the use of software to control the system; and the track-via-missile (TVM) concept. Prototype equipment functionally identical to that required the tactical system was built. This demonstration model was used to accomplish analyses and tests. As a result of the successful AD program, on 31 March 1972 the Deputy Secretary of Defense approved entry into engineering development, and a contract was awarded to Raytheon.
- b. (U) Five individual fire units were built during Engineering Development. Fire unit 1 was constructed in a nonmobile configuration as the radar antenna and the launcher were installed in fixed positions at White Sands Missile Range (WSMR), NM. Communications and coordination data were exchanged by cables between the equipment elements. Fire Unit 2 was the first mobile fire unit. The radar and launcher were rotatable on their separate trailers and the control station equipment was in a van much like the final tactical design will be, but communications and coordination data were still by wire between elements. Fire Units 3, 4, and 5 are essentially in a tactical configuration as the production units will be. Communication by radio data link is used for the tests with these units. Besides their severe individual tests, Fire Units 3, 4, and 5 are included in tests of the battalion command and coordination capability. By exchanging data and receiving tactical directions from the battalion unit by tactical digital radio signals, these tests exercised multiple fire unit tactical requirements. These tests of production-like equipment provided input for a production decision.
- c. (U) The engineering development (ED) test program was organized into contractor and government testing called Engineering Design Tests (EDT) and Prototype Qualification Tests (PQT). The objective of the testing was to allow maximum use of contractor data and avoid duplicative testing when possible. The contractor testing was divided into three phases:

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Program Element: #6.43.07.A

DOD Mission Ares: #222 - Ground-Based Antiair and Tactical

Missile Defense

Title: Patriot (SAM-D) Title: Patriot (SAM-D)

Budge: Activity: #4 - Tactical Programs

the first phase was the initial proof-of-principle and EDT firings; the second was between February 1976-November 1977; and the third continued until February 1980. The contractor fired 50 missiles during these phases. The government program was originally configured to fire 70 missiles. Thirty firings were reduced by the elimination of DT/OT III, and fifteen were reduced in 1977 because data from other missions would suffice leaving 25 for DT/OT. The reduction was offset partially by adding simulation capabilities to provide a more comprehensive system evaluation. These 25 firings were reduced subsequently to 16 when a jammer could not be developed to stress the system. Sixty-eight missiles were fired in ED by the contractor and the Government. A summary of these firings is shown at subparagraph h below. Additionally, seven (7) missiles were fired in an OSD-directed extended R&D program, as shown in paragraph 4h. Eight more missiles are planned to be fired in an electronics countermeasure growth program.

The ED program progressed to build prototype equipment to be used in tests and firings. Ten Control Test Vehicles (CTV) were fired to prove missile serodynamics and control. The ED program was reoriented in January 1974 to demonstrate the Track-Via-Missile (TVM) guidance concept through the Proof-o:-Principle (POP) firing program. Phase I sys tem demonstration firings comprised of fourteen missiles were initiated by the contractor in February 1975 and continued through February 1976. As a prerequisite to the live firings, Captive Carry Flight Tests were conducted. These captive tests used a missile without rocket motor mounted on an aircraft to simulate the free space guidance conditions of a missile intercepting a target. The firing phase demonstrated the Track-Via-Missile guidance, the guidance modes, and fuzing functions. Due to the success of the missile firings, the DOD objectives of the Proof-of-Principal demonstration were met with the first six Patriot guided missile flights against target aircraft. The target conditions included maneuver, high "g" Five additional engineering evaluation fir-

ings were performed against targets of

An additional three missiles were fired as CTV's to complete the matrix of missile aerodynamic data. Thirteen of the missile flights were successful using an ED demonstration model system. No major deficiencies were discovered during this phase, and at the conclusion of Proof-of-Principle firings, full Engineering Development status was restored.

During Phase II tests, February 1976 to November 1977, the contractor demonstrated system performance and fired nine missiles usin; fire unit 1 against various electronic countermeasures. An extensive search/track test program was conducted to exercise the system against various electronic countermeasures (ECH) and target scenarios. These tests included

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical

Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)

Budget Activity: #4 - Tactical Programs

In addition, the data from these tests were used to evaluate: system diagnostic capabilities; built-in test equipment (BITE); reliability, availability, and maintainability (RAM); system status monitor; system displays and controls. All missile firings were successfully conducted against targets of various intercept geometries in the presence of Multiple simultaneous engagements were performed to demonstrate the capability to control multiple missiles in terminal guidance while simultaneously conducting surveillance functions. As in Phase I, the Phase II firing tests revealed no major deficiencies; minor adjustments to equipment were made as required. During this phase an ASARC decision concurred by OSD was made to accelerate the program by moving the full-production decision from March 1963 to April 1980. This decision eliminated DT/OT III, and thirty firings and replaced it with a Production Confirmatory Test and a follow-on evaluation. The overall success of the first 23 firings and the need for placing the system into the field led to this decision.

- (3) (U) Phase III contractor tests were completed in February 1980. They consisted of 28 missile flights in electronic countermeasures (ECM) environments in addition to system environmental and multiple fire unit search/track tests. The Government has monitored and participated in the PQT by the contractor (PQT-C) to satisfy as many PQT-G requirements as practicable. Military personnel were incorporated into the program to assess critical man-machine interfaces. Development Test and Operational Test evaluators shared test data for use during their independent evaluations. These tests were completed in August 1980.
- d. (U) The OT/DT events utilized prototype FU's 3, 4, and 5 for the conduct of both tests. FU 3 was used only for specific tests during OT. The Communications Relay Set (CRS) (which provides for relaying data from Fire Units to the battalion level system) utilized for these tests was furnished by the Army Communications Research and Development Command (CORADCOM) and is electronically equivalent to the required system. The production CRS will be functionally equivalent to the CORADCOM configuration but will be manufactured by the prime contractor. The current Antenna Mast Set (AMS) (which raises the antenna to transmit the data between FU's and the battalion system) is an Army Standard item but does not meet Patriot emplacement time requirements. It also is being redesigned. The electronic equivalents of the CRS and AMS were available for testing in DT/OT II.

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical
Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)

Budget Activity: 44 - Tactical Programs

e. (U) Reliability and maintainability data have been collected on Patriot firing units since early in Engineering Development (ED) beginning with factory integration testing and continuing with systems testing at White Sands Missile Range, NM. As a result of this process, reliability and maintainability problems were identified early, and corrective actions were incorporated in the later ED firing units.

- f. (U) Environmental qualification tests were conducted as a coordinated government-contract: test program to determine the effects of natural and induced environments. Climatic testing has been conducted at Eglin AFB, FL, and at the contractor plant facilities and WSMR. Mobility, transportability tests on the launcher and missile were conducted at Aberdeen Proving Ground, HD, during the 2d and 3d quarter FY80. Compromising emanations testing was conducted at WSMR.
- g. (U) The development contractor for the Patriot system is Raytheon Company, Bedford, MA, with Hartin Harietta of Orlando, FL, as the primary subcontracter for the missile. BG Jerry M. Bunyard is the Patriot Project Manager. The development testing was conducted by the US Army Test & Evaluation Command (TECOM), and the operational test conducted by the US Army Operational Test & Evaluation Agency (OTEA).
- h. Patriot Flight Test Results. (Excludes verification program which is shown at paragraph 4h.) From 27 February 1975 through 21 July 1980, 66 missiles were fired in the Patriot ED test program. Mission results and reliability scoring totals for these flight tests are as follows:

MISSION RESULTS

RELIABILITY SCORING

8 No Tests

12 No Zests

Mission results are based on criteria of the project manager for contractor firings, AMSAA for DT firings, and OTEA for OT firings. Reliability acoring is based on test community scoring criteria.

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Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)

Budget Activity: #4 - Tactical Programs

2. (U) Operational lest and Evaluation:

- (U) The US Army Operational Test and Evaluation Agency(OTEA) completed Operational Test II (OT II) in March 1980 and will conduct a Follow-on Evaluation (FOE) prior to deployment. Nine of eighteen Government test missiles were fired under the control of OTEA. An independent evaluation report was provided by OTEA. OT II was conducted at White Sands Missile Range and Ft Bliss, TX, on prototype equipment manned by soldiers from an active duty battalion. These soldiers were selected by the US Army Training and Doctrine Command, were trained by the project management office for these tests, and underwent collective training by TRADOC.
- The Patriot OT II was a ten-month, two-phase test with a Patriot Battalion minus (consisting of two firing units, a command and coordination set (CSS), and associated government equipment) which conducted field exercises, tactical evaluations, nonfiring exercises, and live firings. Phase I began in Jan 79 and covered approximately eight months. It included the new equipment training for operator and maintenance personnel and unit collective training. Phase II was delayed from 31 Aug to 1 Nov 79 by software integration problems. Subtest 1 was a Tactical Effectiveness Evaluation (TEE) conducted under scenarios realistically depicting the threat environment to assess operator/machine capabilities. During Subtest 2, the Patriot units deployed and conducted movements under realistic operational field conditions. During Subtest 3 conducted 8-14 January, the Patriot units engaged manned targets during ten repetitions with approximately 46 aircraft each during nonfire search/track exercise. Subtest 4 was a series of four line fire exercises with one or two fire units launching nine missiles in four separate firings during multiple simultaneous engagements.

The Patriot CCS was interfaced with an Air Defense Group Command and Control System, the AN/TSQ-73, when the battalion operated in the centralized or decentralized methods of control for both live fire and nonfire exercises.

c. (U) OT II soldier training was an eight-month phase that primarily addressed the New Equipment Training (NET) and collective training required to qualify personnel to operate Patriot system elements. The US Army Training and Doctrine Command (TRADOC) designated the number of personnel and positions required to operate the Patriot Battalion slice tested in OT II, and these personnel attended NET provided by the Patriot Project Manager. The instruction in NET included launcher and fire control operations, crew actions, initialization, operator functions, and organizational maintenance procedures. Training on the operation and maintenance of government-furnished equipment (GFE) incorporated into Patriot was also

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Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: Patriot (SAM-D) Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

included. TRADOC provided approximately one month of collective training in addition to NET. Evaluations of the scope and quality of training, as well as test performance data and debriefings administered throughout the test, were used to obtain information on the adequacy of training. OTEA monitored the training phase.

- d. (U) The equipment utilized for OT II was preproduction prototype configuration Fire Units 4 and 5 except for the CRS and AMS. These latter items will be fully evaluated during the production confirmatory test and follow-on evaluation.

 The entire Patriot system will be evaluated in the FOE which will be conducted by OTEA in two parts. The first part will be conducted during the collective Unit Training of the 1st Battalion to be deployed to FORSCOM. The second will consist of maneuver, search/track and missile firings.
 - System Characteristics: The essential system requirements at the confidential level are provided below.

Objectives

Operational/Technical Characteristics

Range (km) - Max

Min

Altitude (km) - Max Min

Target - Max Velocity (m/s)

Target Manever (g)

in formation

Availability - Inherent Missile

MIBF (hrs)

Reaction lime (Auto) (Sec)

Reload Time (Min)

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Project: #D212

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical
Missile Defense

Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

Title: Patriot (SAM-D)

4. (U) Patriot Verification Program:

- a. (U) An extended R&D phase is being conducted in which preproduction prototype configuration fire units were modified and tested to performance values that will ensure that deficient areas found in DT/OT II have been corrected.
- b. (U) Periodic reviews will be held to review results from four units of evaluation. Units 1 and 2 were those development-type evaluations/events conducted by the contractor and Project Manager. Units 3 and 4 are formal tests of the Patriot system uncer the test direction and control of TECOM and OTEA respectively. Independent Evaluation Reports (IER) are to be rendered for these two tests. AMSAA will provide an IER for Unit 3, and OTEA and AMSAA will provide IER's for Unit 4 testing. At the completion of each of these four units, progress reports will be provided to USDRE (DDTE) for his use in evaluating development progress and in reporting his evaluation to the DSARC principals. Each series of tests will be evaluated against predetermined criteria.
- c. (U) The complete test program will be conducted in accordance with a revised Test and Evaluation Master Plan (TEMP). The TEMP was structured along the lines of the tests and reviews of DDTE Memo, subject: Test and Evaluation Assessment of PATRIOT (U)(S), dated 15 Aug 80.
- d. (U) Test Unit One consisted of software design and test reviews by an independent panel, completion of the diagnostic software programs to include testing in a fire unit, incorporation of ECCM software changes and testing, the retrofit and testing of the missile, and a reliability demonstration on the improved design of the Electric Power Plant. These tests have been completed and results reviewed by OSD.
- e. (U) Unit Two testing included software checkout and endurance demonstration, a series of search/track missions, retrofit of the fire unit with improved reliability components, three missile flights, and final checkout for the reliability, availability, and maintainability demonstration. This series of tests has also been completed and results reviewed by OSD.
- f. (U) Unit Three testing included missile transportation and handling, four missile flights, multifunction capability/multiple simultaneous engagement, and a reliability and maintainability demonstration. These tests have been

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Project: #D212 Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactica Programs

successfully completed, and the results have been reviewed by 050. A summary of Unit 2 and 3 firings is shown at subparagraph h below.

g. (U) Test Unit Four is a Follow-On Evaluation of Production Systems conducted by the Operational Test and Evaluation Agency. This test will consist of an evaluation of training and an operational test consisting of a field maneuver exercise, search/track missions and missile firings. Unit Four will provide test data to determine if previous system deficiencies have been corrected and if the system is suitable for fielding.

h.	Patriot Verific	ation Program Flight Test Re	M4 4	Dollant 414on	
Flt No.	Date	Engagement Objective	FU	Mission Results1/	Reliability Scoring2
CH-1	11 Jun 81		4		**
CM-3	16 Jun 81		4		
CM-2	18 Jun 81	·	4		
CM-5	27 Jun 81		. 4	ı	
CM-7	8 Jul 81	~ ~	4		
CH-6	11 Jul 81		4		
CM-53/	10 Aug 81	•	4		

1/ Mission results based on criteria of Project Manager for CM-1, 2 and 3, and TECOM for CM-4, 5, 6 and 7.

Reliability scoring based on Test Community scoring criteria. CM-4 missile used for second CM-5 firing.

Project: #D212
Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antisir and Tactical

Missile Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

5. (U) Test Schedule Summary:

Test	Dates	Equipment	Equipment Type
Unit 1	Jul 80-Jan 81	FU's 3, 4, 5	Production Prototype
Unit 2	Jan-Jun 81	FU's 3, 4, 5	Production Prototype
Unit 3	Jun-Oct 81	FU's 4, 5	Production Prototype
Software	May 82-Aug 82	FU 3, 4	Production Prototype
Component Design	_		
Configuration (CDC)	Aug 82-Oct 82	PS 2, 3	Production
System Design	_	•	
Configuration (SDC)	Nov 62-Dec 62	PS 2, 3	Production
Unit 4	Oct 82-May 63	PS 2, 3, 5	Production
Environmental Qual-	•		
ification Test (EQT)	Dec 82-Feb 84	PS 6	Production

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D213

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: PATRIOT Electronic Counter-Countermeasure (ECCM) Enhancement

Title: PATRIOT (SAM-D)
Budget Activity: 14 - Tactical Programs

DETAILED BACKGROUND AND DESCRIPTION: The Patriot system is being developed to replace Nike-Hercules and Hawk in the Field Army. Fatriot's engineering development has been keyed to an Electronic Countermeasure (ECN) threat postulated of the threat.

Improvements from this program will allow Patriot to Both hardware and software enhancements will be made to achieve the improved performance. Hardware improvements

· Software improvements include:

B. (U) RELATED ACTIVITIES: None

C. (U) WORK PERFORMED BY: The Raytheon Company, Bedford, MA, is the prime contractor. Teledyne Brown, Huntsville, AL, is a Software Verification and Validation Contractor. Government agency in-house work will be done by harry Diamond Laboratories, Adelphi, MD, and the project will be managed by the Patriot Project Management Office, Huntsville, AL.

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: PATRIOT Electronic Counter-Countermeasure (ECCM) Enhancement

Title: PATRIOT (SAM-D)
Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

FY 1981 and Prior Accomplishments: The program was initiated in 1981. Conceptual design, initial definition of performance trade-offs, and initial design efforts began on those items having a significant improvement in performance against the The study tasks were initiated with the following tasks selected for the development phase during the FY82 timeframe:

FY 1982 Program: Studies will be initiated or continued in the following areas:

Purchase of six missiles for use in testing of system enhancements will be initiated, and integrated logistics support will be provided for the tasks.

FY 1983 Planned Program: Initiate tasks to accomplish the surveillance, guidance, and armement functions against targets having Countinue design, testing, and qualifying the hardware and software changes from Patriot systems enhanced capabilities in the following areas:

targets in an advanced ECM environment, complete development of the software improvements to address

enhanced capability of engaging jamming for the engagement control station, Initiate development of Integrated logistics sup-

port will be continued.

4. FY 1984 Planned Program: Hardware incorporation into the production program of New software that includes engagement of will be initiated for issue to deployed assets. The development and test of improved. will be completed. The task to accomplish the surveillance, guidance, and armement functions against

Title: PATRIOT Electronic Counter-Countermeasure (ECCM) Enhancement

Program Element: #6.43.07.A

DOD Mission Area: #222 - Ground-Based Antiair and Tactical Missile Defense

Title: PATRIOT (SAM-D)
Budget Activity: #4 - Tactical Programs

targets having

Integrated logistics support will also be continued.

- 5. Program to Completion: Continue the development effort to accomplish the surveillance, guidance, and armment functions against targets having

 Initiate purchase of two missiles to support testing of this task. Integrated logistics support will be continued.
 - 6. (U) Major Milestones: Not applicable to this project.
 - 7. (U) Resources (\$ in thousands):

RDTE	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	PY 1984 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	16573	27971	27477	15879	8643	96543
Funds (as shown in FY 1982	200.4		_,,,,,		••••	,,,,,
submission)	19573	28058	28130	Not Shown	Not Shown	Not Shown
Quantities (current requirements)						Not Applicable
Quantities (as shown in FY 1982 submission)						Not Applicable

Note: Differences in FY81, 82, and 83 are primarily due to inflation adjustments and some internal restructuring between projects.

Other Appropriations: Improvements developed as part of this program will be incorporated in future production contracts when system design is finalized and tested. Production funds are programed in the outyears to modify those items of equipment which will have been deployed prior to completion of these development efforts.

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.43.09.A

DOD Mission Area: #222 - Ground Based Antisir and Tactical Missile Defense

Title: ROLAND

Budget Activity: #4 - Tactical Program

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

Project Number	Title	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	12613	O	a	0	0	297997
	QUANTITY-Fire Units						4
	QUANTITY-Missiles						90
D647	ROLAND	12613	0	0	0	0	297997

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the transfer of the design of the French/Garman ROLAND II All-Weather Short-Range Air Defense (SHORAD) missile system to the US. A US ROLAND all-weather system has been fabricated and tested. In October 1979, a US production base began producing US ROLAND to meet the Army's all-weather SHORAD missile requirement. This system is required to fill the Army's need for an all-weather SHORAD system to defend critical assets in rear areas against low-flying, high-performance aircraft.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: Reduction in resources previously available to Ground Air Defense due to current Army fiscal constraints and relative priority of US ROLAND vis-a-vis those ground air defense systems funded.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.10.A

DOD Mission Ares: #212 - Indirect Fire Support

Title: Heliborne Missile - HELLFIRE
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 44470	FY 1982 Eatimate 24225	FY 1983 Estimate 19327	FY 1984 Estimate 285	Additional to Completion 18549	Total Estimated Cost 337701 229
D074	Heliborne Missile - HELLFIRE	44470	24225	19327	285	18549	337701

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: HELLFIRE is a heliborne antiarmor terminal homing modular missile system which uses terminal homing guidance and a shaped charge warhead to defeat hard targets. HELLFIRE will use semiactive laser terminal homing guidance, but has been designed to accept various other guidance packages. The missile system will be employed from Advanced Attack Helicopters (AH-64's) against heavily armored vehicles at longer standoff ranges and with greater lethality than missiles currently in the inventory. HELLFIRE will provide accurate fire on targets acquired and autonomously designated by the attack helicopter or remotely designated by ground observers, other attack helicopters, and serial acout helicopters. HELLFIRE can be employed in a wide variety of firing modes in day or night operations. It is being developed RELLFIRE will provide greater versatility than missile systems currently in the inventory, and its mission engagement capability will be enhanced by the variety of methods of designation and firing techniques. The system is needed to counter the expanding armor threat. It has been designed to be adaptive, to be highly lethal, and to reduce launch aircraft vulneratility and to defeat

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Program Element: #6.43.10.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Heliborne Missile - HELLFIRE

Budget Activity: 44 - Tactical Programs

C. (U) BASIS FOR FY 1983 RDTE REQUEST:

1. (U) Engineering Development of the HELLFIRE Modular Missile System will continue through FY 1984. Performance and qualification testing of a minimum smoke motor will be completed in FY83. Six HELLFIRE missiles that have been subjected to environmental storage will be flight tested at Eglin Air Force Base. The first production hardware from the FY82 buy will be delivered for production validation tests, and the testing will be completed. The configuration item verification review (CIVR) will be completed on first production items.

2. (U) Development costs included in this Congressional Descriptive Summary have been validated by the Office of the Comptroller of the Army.

Hajor Hilestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Army Systems Acquisition Review Council/Defense Systems Acquisition Review Council (ASARC/ DSARC II)	Feb 76	Feb 76
Engineering Development (ED) Contract Award	0ct 76	Oct 76
Operational Test (OT) II Start	Apr 80	Apr 80
Initial Production Contract Award	Feb 82	Nov 81
Missile & Launcher Availability	Nov 83	Jul 83
Initial Operational Capability (IOC) on Advanced Attack Helicopter (AAH)	PY 1985	Oct 84

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Program Element: #6.43.10.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Heliborne Missile - HELLFIRE
Budget Activity: 44 - Tactical Programs

The initial production contract award was changed to February 1982 to permit additional AH-64 contract negotiations prior to the OSD production milestone review for AH-64 and HELLFIRE, resulting also in the missile and launcher availability slip. A revision in Army procedures in Headquarters, Department of the Army Letter 310-81, 31 August 1981, requires IOC to be projected to a fiscal year.

D. (U) COMPARISON WITH FY 1982 ROTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	44470	24225	19327	18834	337701
Funds (se shown in FY 1982 submission)	44470	24300	19671	0	320309

The decrease in FY 1982 (\$-75) was due to a Congressional program cut. The decrease in FY 1983 (\$-344) is due to adjustments in the inflation indices. The additional to completion increase (\$+17392) will complete development and testing of the missile test program sets for the USM-410 Equate Automatic test equipment to support unit and depot maintenance.

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Program Element: #6.43.10.A

Title: Heliborne Missile - HELLFIRE DOD Mission Area: #212 - Indirect Fire Support Budget Activity: #4 - Tactical Programs

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

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Missile Proculement, Army						
Funda (current requirements) Funda (as shown in FY 1982	25699	116100	250300	258000	985700	16357 99
submission)	20995	96540	120726	-	1094888	1333149
Quantities (current requirements Quantities (as shown in FY 1982)	680	3971	6218	24887	35756
submission)		502	1213	-	22885	24600
Avistion Procurement, Army (Launchers)						
Funds (current requirements) Funds (as shown in FY82			17200	17500	34400	69100
submission)			_	-	-	-
Quantities (current requirements Quantities (as shown in FY82)		338	398	806	1542
submission)			-	-	-	_

The FY 1981 increase reflects a reprograming of \$4.9M from the HAWK program to adequately cover long-lead item/facilitization contracts in FY81. The increases in FY82 and FY83 are due to a return to economic buy quantities as reflected in the FY82 Reagan budget. The increase in the total estimated cost for this program element is due to the increased required buy quantities reflected in the current requirements line above. These quantities were approved by the Army Systems Acquisition Review Council on 18 November 1981, as fulfilling current requirements for testing, war reserve (to include aircraft basic load), and system verification/training rounds. The apparrent additional funds in the Aviation Procurement, Army appropriation reflect a breakout of HELLFIRE launcher funds from Missile Procurement, Army appropriation to comply with Department of Defense policy that launchers be bought with the aircraft rather than the missile.

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Program Element: #6.43.10.A

DOD Mission Ares: #212 - Indirect Fire Support

Title: Heliborne Missile - HELLFIRE
Budget Activity: #4 - Tactical Programs

DETAILED BACKGROUND AND DESCRIPTION: This program began with exploratory development in laser guidance. Previous work by the Army, Navy, and Air Force established the technical feasibility of using lasers to designate targets for terminal homing of laser seeker-equipped ordnance. The Army conducted a successful prototype flight test program using the Air Force HORNET missile modified with laser terminal homing capabilities. The flight tests reduced the developmental risk and demonstrated the feasibility of helicopter-launched laser-guided missiles. During exploratory flight tests, fifty-six missiles were fired from ground and aerial launch platforms using ground and airhorne designation. Forty-one were successful. Competitive Advanced Development (AD) contracts for system design concepts were awarded to Hughes Aircraft Company and Rockwell International Corporation in June 1974. In October 1976 Rockwell was selected as the prime contractor for Engineering Development (ED). Earlier in 1974 the Air Force was designated by the Department of Defense as the executive agent for the Tri-Service Laser Seeker. An Air Force contract was awarded for the Engineering Development of seekers to be used on the Air Force MAVERICK missile and the Army's HELLFIRE missile. Due to the projected high production cost of this tri-Service seeker, the Army and Air Force pursued a joint cost reduction effort. In addition, the Army initiated a low-cost seeker program with Martin Marietta Corporation to provide competition in the seeker development with the purpose of reducing production seeker costs. In November 1978, the Army selected the Martin Marietta seeker to be used for missile system qualification and cancelled the Army requirement for the Rockwell developmental prototypes. HELLFIRE will be effective against targets at ranges up to in the direct fire mode and to in the indirect mode. The longer standoff range and the ability of the helicopters to mask behind terrain features provide a significant increase in helicopter survivability over antiarmor helicopters currently in the inventory. The lethality against advanced armor, longer range, less time of flight, and versatility of HELLFIRE provide the Army a significant improvement to defeat armor compared to TOW missiles. The 7-inch-diameter HELLFIRE missile will weigh 99.8 pounds.

and be capable of

This system
will provide the Army with a common missile airframe capable of accepting a family of terminal homing seeker modules to
engage a variety of targets. The initial seeker module will be a laser seeker which provides the capability to deliver
accurate fire on hard point targets which have been designated by a laser designator. Other seeker modules may include a
fire-and-forget seeker and an air defense suppression seeker.

G. (U) RELATED ACTIVITIES: The HELLFIRE missile system is related to Air Force, Navy, and other Army systems which utilize similar technology. Technology coordination groups preclude duplication of effort. The exploratory prototype program was conducted under Program Element (P.E.) 6.23.03.A, Missile Technology, and the Advanced Development effort was conducted under P.E. 6.33.10.A, Heliborne Missile - HELLFIRE. The US Air Force portion of the tri-Service development was funded under P.E. 6.46.08.F, Close Air Support Weapon Systems. The Air Force has elected not to employ the tri-Service laser

Program Element: #6.43.10.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Heliborne Missile - HELLFIRE
Budget Activity: #4 - Tactical Programs

seeker on the MAVERICK missile. The Advanced Attack Helicopter is funded under P.E. 6.42.07.A. There is no duplication of effort between HEL.FIRE and other Army or DOD systems within similar size, weight, range, and mission requirement classification.

H. (U) WORK PERFORMED BY: Contractors are Rockwell International Corporation, Columbus, OH, for missile development, and Martin Marietta Corporation, Orlando, FL, for laser seeker development. The Army program manager (PM) is PM, HELLFIRE at Redstone Arsenal, AL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: Exploratory development work started in FY 1971. The FY 1972 program initiated concept formulation activities. This effort included work on fire control integration, laser measurements, countermeasure investigations, and warhead design. Exploratory flight tests were conducted with 5-degree and 40-degree field-of-view seekers to obtain information on the achievability of terminal and designator tracking accuracy. The funding provided exploratory configuration hardware for operational tests. The FY 1973 program provided for completion of a cost-effectiveness study and two phases of Military Potential rests (MPT). These efforts were designed to provide a pasis for a decision to enter full-scale development of a laser-guided missile in FY 1974. The results from the MPT and Cost and Operational Effectiveness Analysis (COEA), however, revealed some operational uncertainties requiring further investigation. These uncertainties were demonstration of different modes in varied battlefield conditions and assessment of system vulnerability, command and control requirements, and reaction times. Consequently, during the 3rd quarter of FY 1974 it was decided to retain the laser missile program in Advanced Development (AD) for two more years. These demonstration and assessment uncertainties were resolved in further exploratory tests. Rockwell International Corporation and Hughes Aircraft Company were selected in 1974 to continue development of modular missile technology for eventual competitive selection of one Engineering Development (ED) contractor. Efforts during FY 1974 included follow-on technical tests, field tests, and extensive use of simulation to resolve the operational questions. Additional firings using the earlier experimental hardware were accomplished at Redstone Arsenal, AL. The two contractors were awarded contracts to conduct HELLFIRE modularity/verification flight tests. Because of FY 1976 funding constraints, the flight tests were not conducted. The contractors performed hardware-in-loop simulation and alternate missile design concept effort in FY 1976. In-house effort in FY 1976 and FY 1976 supported the Cost and Operational Effectiveness Analysis (COEA), Army Systems Acquisition Review Council/Defense System Acquisition Review Council (ASARC/DSARC), and preparation for award of the Engineering Development (ED) contract. In FY 1977 the ED contract was awarded, the contract performance baseline established, the design effort

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initiated, major subcontracts awarded, and test plans developed. In FY 1978 the first ballistic and programed rounds were fired. Component and subsystem performance tests were completed, and the new equipment training was initiated. The system was flight certified for the AH-1 testbed aircraft. Procurement, fabrication, and testing of hardware were continued in FY 1979. The Engineering Design guided flight test program was initiated. Three programed rounds were successfully tested, and eleven of thirteen guided flights were successful. Integration of HELLFIRE with the YAH-64 helicopter was successfully demonstrated in FY 1979. The Martin Marietta low-cost seeker was integrated with the HELLFIRE missile and successfully flight tested. The AAH/hELLFIRE battlefield obscuration testing which was initiated in FY 1978 was continued in FY 1979 and FY 1980. Government and contractor testing was intensified in FY 1980. Engineering Design Flight Tests (EDT) and component and system Prototype Qualification Tests conducted by the contractor (PQT-C) were continued. Fifty tactical prototype missiles, were flight tested in the HELLFIRE EDT and PQT flight test programs. Forty-six development and tactical prototype missiles were fired from the YAH-64 helicopter including day and night launches with laser designation from its Target Acquisition Designation Sight. Operational Tests (OT) were conducted by the Operational Test and Evaluation Agency (OTEA) and supported by the system prime contractor. The AH-1 (COBRA) was used as the testbed aircraft and 33 tactical prototype missiles were flight tested in operational tests. HELLFIRE engineering development testing and contractor system qualification tests were 82% completed during FY 1981 and technical problems corrected. Testing of warheads against advanced armor was completed by the Ballistics Research Laboratory. The Technical Dats Package (TDP) was amended to incorporate changes resulting from operational tests. Technical improvement efforts included initiation of the minimum smoke motor development and changes in the laser seeker section to enhance producibility. The Production Engineering Planning (PEP) effort was com-The AH-64 Helicopter OT Il tests were supported with hardware and technical support. Contracts for Initial Production Facilities (IPF) and procurement of long-lead items were swarded to the system prime and seeker contractors. Preparations were made for Milestone Ill production decision reviews and for subsequent sward of production contracts.

- 2. (U) FY 1982 Program: Development and testing of the minimum smoke motor will start in FY 1982. Test program sets for launcher test support will be completed. Environmental storage of missiles will begin. Deficiencies revealed in the AH-64 operational tests will be corrected. The Defense Systems Acquisition Review Council (DSARC) III decision review will be held in FY 1982 with subsequent award of the first production contract. Developmental countermeasures analysis and testing will continue.
- 3. (U) FY 1983 Planned Program: Performance and qualification testing of the minimum smoke motor will be completed in FY 1983, and missiles with the improved motor will be available for in the third production buy; six missiles will continue to be subjected to environmental storage tests. The first production hardware will begin deliveries, and the Configuration Item Verification Review (CIVR) will begin.

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- 4. (U) FY 1964 Planned Program: Development and testing of launcher test program sets for aviation unit maintenance and depot maintenance will be completed. Planned product improvements for HELLFIRE will be initiated as appropriate to enhance system effectiveness. HELLFIRE is scheduled to be operational on the AH-64 Helicopter in FY 1985.
- 5. (U) Program to Completion: Development and testing of missile test program sets for the USM-410 Equate automatic test equipment to support unit and depot maintenance and appropriate planned product improvements will continue through FY 1988.

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J. (U) TEST AND EVALUATION DATA:

- 1. (U) Development Test and Evaluation:
 - a. (U) Summary of test phases and objectives.
- Evaluation of the HELLFIRE system concept started in 1969, and the Terminal Homing Accuracy Demonstration (THAD) Program was started in 1970. A modified HORNET missile (7") with a modified Falcon motor was used as the testbed missile to demonstrate feasibility. Technical feasibility of laser homing missiles was demonstrated during the THAD Program (May 1971 through January 1972). This exploratory prototype program demonstrated a circular error probability (CEP) of [16 inches) based on 14 missile firings. Missile flight tests of the wide-field-of-view laser seeker and the Army laser seeker were conducted at US Army Missile Command (MICOM), using the testhed 7" missile, from November 1971 through January 1974. Combined results from these tests and the THAD tests were used to support Development Test I (DT-1). Further technical tests were conducted at a MICOM test range from 24 April 1974 through 26 June 1975 to demonstrate the feasibility of the ripple, rapid, night, airborne indirect, and ground indirect modes of operation for the HELLFIRE. Countermeasure susceptibility testing was conducted at White Sands Missile Range, New Mexico, during the second and third quarter FY74 and the second and third quarter FY75 to qualitatively and quantitatively assess the capability of the Army laser seeker (plus counter-countermeasures options) to successfully complete their missions in a hostile environment. Feasibility testing of 6-inch-diameter tandem liner warheads for the HELLFIRE missile was conducted by Firestone Tire and Rubber Company during , were tested. The Department of the Army requested that the HELLFIRE FY75. Two tandem liner configurations, project manager investigate improving the performance of the warhead by scaling up the 6"-diameter design to 7" and 8" diameters. The seven-inch configuration was selected to be continued into Engineering Development (ED).
- (2) (U) Engineering Development (ED) testing consisted of a series of Engineering Design Tests (EDT-C) and Prototype Qualification Tests (PQT-C) conducted by the contractor and EDT-C and PQT-C conducted by the government to provide data necessary for determining the HELLFIRE Modular Missile System's (HMMS) readiness to transition into production. Testing was initiated by selecting and testing components and subsystems using an orderly progression of performance demonstrations with prototype models of the entire HMMS system. Additionally, testing has included participation of representative user personnel and "environmental proofing" through simulated and actual environmental testing. Reliability,

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availability, and maintainability (RAM) has been evaluated throughout development and will continue. the material developer to progressively evaluate and refine component, subsystem, and system design to assure that system performance requirements are being achieved. Development tests were conducted so that important system characteristics would be tested and deficiencies corrected prior to the Army Systems Acquisition Review Council (ASARC III). Six modified AH-1G helicopters, four basic and two equipped with the Airborne Target Acquisition and Fire Control System (ATAFCS), were utilized as "testbed" sircraft to qualify the HELLFIRE Modular Missile System (HMMS). HELLFIRE missiles were also being launched from the AH-64 as part of the Advanced Attack Helicopter (AAH) developmental testing. Contractor component/subsystem tests were initiated in January 1978 with contractor laboratory testing of selected piece parts and included subsequent testing of components, subassemblies, and assemblies of each HELLFIRE end item. Results from these tests substantiated performance of components when integrated with other components and subsystems of their end items and validated their selection as part of the HMMS. Samples of critical components were independently tested and evaluated by the Government. Unguided missile (ballistic) flights were conducted early in the development program to provide data for missile sirframe/propulsion and launcher design as it relates to missile launch parameters and helicopter safety. Preprogramed missile flight tests were conducted to provide missile integration. Guided flight tests are being conducted to demonstrate performance of end items as the configuration progressed toward final design. Contractor Component Qualification Tests were initiated in December 1978 to determine if critical components met their performance requirements while operating under or after being subjected to the environmental extremes from -45°F to +145°F. System Qualification Tests are being conducted to determine if system end items met their performance requirements while operating under or following exposure, as appropriate, to natural combinations of environments specified for the system. Environmental/Storage Tests will start January 1982, and will demonstrate HMMS performance in the varied adverse environments.

(3) (II) In accordance with Department of the Army direction, the Army Missile Command (MICOM) Laboratory has conducted a properam to evaluate and characterize Advanced Attack Helicopter (AAH)/HELLFIRE performance in battlefield obscuration environments. The effort to gather field test data for development of a simulation model development to predict the performance of the target acquisition and designator system for the AAH, the HELLFIRE seeker, and the Ground Laser Locator Designator, was completed during FY80. This data, time-correlated to carefully measured obscuration environments, was the primary input to the Battlefield Environment Laser Designator Weapon System Simulation (BELDWSS). During the last quarter of FY80, trial runs with BELDWSS to predict system performance were initiated. During the second quarter of FY81, the simulation predictions were validated by system tests including HELLFIRE flight tests in obscurants. In the latter part of FY81 the validated BELDWSS simulation was used to characterize system performance across the entire spectrum of obscurant

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conditions, to provide data for the AAH/HELLFIRE ASARC/DSARC evaluations. There are no Defense Systems Acquisition Review Council-directed tests or demonstrations.

b. (U) One hundred fifteen guided missiles have been launched in the current developmental testing programs for both HELLFIRE and the AAH. Test results, parameters, and malfunctions during developmental guided launches are tabulated below:

(U) Results:

(U) Program (U) Prototype Missiles (Success/Fired)

HELLFIRE 56/69

AH-64 36/46

Total 92/115

(U) Parameters:

Direct Fire Indirect Fire

Lock-on before launch (LOBL)

Lock-on after launch (LOAL) Designation by GLLD

Low and high trajectories

15-degree offset

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Moving target

Day-Night

Designation by GLLD and TADS

Rapid and ripple fire

- (U) <u>Malfunctions</u>: Of the 22 malfunctions during developmental testing, 10 were considered no-test because they were not missile related, e.g., crew error, designator malfunction, etc. The remaining 12 malfunctions were investigated, and successful corrections were implemented; e.g., roll gyro tumbled autopilot was modified; missile impacted short in smoke seeker was modified to last pulse logic, etc.
- c. (U) Description of equipment being tested. The HELLFIRE missile system is a high-explosive antitank (HEAT) missile with a laser seeker, fire control system, launcher, and container. The HELLFIRE launcher carries four missiles and is compatible with the armament stations of both the AH-64 and AH-1 (COBRA). A gas storage system can be installed on the launcher for cooling infrared detectors in follow-on seekers; however, it will not be installed on the production lightweight launcher. It is anticipated that there will be no significant differences between the prototype and the production configurations.
 - d. (U) All subsystems and support equipment have been available during required test periods.
 - e. (U) Developing/Testing Organizations.
 - (1) (U) Divelopment Contractor: Rockwell International Corporation Missile Systems Division 4300 East Fifth Avenue Columbus, OH 43216
 - (2) (U) Service Program Manager: Project Manager, HELLFIRE/GLD

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US Army Missile Command Redstone Arsenal, AL 35809

- (3) (U) Development Test Agency: US Army Test and Evaluation Command Aberdeen Proving Ground, MD 21005
- (4) (U) Independent Operational Test Agency: US Army Operational Test and Evaluation Agency (OTEA) 5600 Columbia Pike Falls Church, VA 22041
- f. (U) Major Test Facilities.
- (1) (U) US Army Missile Command, Redstone Arsenal, AL Confractor and government personnel have been conducting the missile flight, captive flight, component qualification, system qualification, and electromagnetic radiation tests.
 - (2) (U) Eglin AFB, Florida Contractor and government personnel have been conducting missile fligt. tests.
- (3) (U) Yuma Proving Ground, Arizona Contractor and government personnel are conducting AH-64/HELLFIRE integration tests to include missile flight tests.
- (4) (U) Hunter Liggett Military Reservation, California Government personnel conducted and participated in the operational testing.
 - g. (U) Overall test program schedule.
 - (1) (U) Missile flight tests, Oct 78 Jun 81.
 - (2) (U) Component Qualification Tests, Dec 78 Jan 81.
 - (3) (U) System Qualification Tests, Jan 80 Jan 81.

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- (4) (U) Environmental Storage Tests (PQT-G), Aug 80 Jul 82.
- h. (U) Tabulation of developmental firings in HELLFIRE and Advanced Attack Helicopter programs.

		Type Missile	No. Flights Planned/Completed/Successful		
(1)	Exploratory Development	Modified Hornet	56	56	41
(2)	Terminal Homing Accuracy Demonstration (THAD)	Modified Hornet	15	15	15
(3)	HELLFIRE Engineering Development				
	Ballistic Rounds	-	3	3	3
	Programed Rounds	-	4	4	4
	Guided Missiles	ED	74	63	51
	Advanced Attack Helicopter	ED			
	Ballistic Rounds	-	16 .	16	16
	Guided Missile	ED	50	45	35

- 1. (U) The HELLFIRE Modular Missile System has not been previously tested by snother DOD component.
- j. (U) HELLFIRE Modular Missile System reliability, availability, and maintainability durability (RAM-D) performance requirements were verified by test, demonstration, and analysis prior to full-scale production using valid data from the guided flight test and system qualification test programs. The test program for mission-critical components included demonstration of high reliability under critical environments. RAM-D trade-offs were performed within allowable limits for achievement of maximum system effectiveness at minimum cost.
- k. (U) The items being tested during development were not significantly different from the hardware for operational tests and production.

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1. (U) Tests are being conducted to determine if the missile, launcher, and container meet their performance requirements while operating under or following exposure to natural and induced environments as specified for the system. This portion of the HELLFIRE test program began in the 2nd quarter of FY80.

2. (U) Operational Test and Evaluation:

- a. (U) Summary of Test Phases and Objectives
- (1) (U) Laser-Guided Missile System (LACUMS) Military Potential Tests were conducted in 1972 and 1973. These tests evaluated the ability of the helicopter gunner to manage the missile system successfully during target engagement and examined the tactical employment of LAGUMS-equipped helicopters. The tests also provided information on exposure and detectability of the launch aircraft and target designators. The results of these tests were used in lieu of Operational Test (OT I). Additional Operational tests were conducted by the US Army Combat Developments Experimentation Command (CDEC) during August-December 1974. These tests measured the vulnerability of the ground target designator. They also compared the mission effectiveness and operational performance of HELLFIRE versus extended range TOW.
- (2) (U) The Operational Test (OT) was conducted May-July 1980 with tactical prototype hardware to validate the operational capability of HELLFIRE using the COBRA helicopter as the testbed vehicle. Data was obtained in an operational environment to assess the operational effectiveness to include command and control, hit performance, human factors, and safety. Information was obtained on the reliability, availability, and maintainability (RAM) of the system during this test. This test was conducted at Hunter Ligget Military Reservation, CA, and was managed by the US Army Operational Test and Evaluation Agency (OTEA).
- (3) (U) On 27 May 1981 the Marine Corps Operational Test and Evaluation Agency at Twenty-Nine Palms, CA, conducted an Operational test using four HELLFIRE missiles on stationary and moving targets. This test was conducted in conjunction with the OT II for the USMC Modular Universal Laser Equipment (MULE). The MULE designated all four targets, and the missiles were launched from the AH-1 surrogate platform.
- (4) (U) The Operational Test II (OT II) for the AAH was conducted Jun-Aug 81 with prototype sircraft. It validated the operational capability of HELLFIRE as an integrated weapon system on its primary firing platform. The data

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collected was used to assess the same factors as listed in paragraph (2) above. The test was conducted at Hunter Liggett Military Reservation, CA, and was managed by the US Army Operational Test and Evaluation Agency.

- b. (U) Summary of Test Results.
- (1) (U) Testing to satisfy the OT I requirements is described in subparagraph E.2.a.(1) above. The operational test described in subparagraph E.2.a.(2) was not designated as an OT II because it evaluated only the operational capability of the HELLFIRE missile and not the total weapon system as it will be fielded. The weapon system was evaluated during the AAH OT II in June-August 1981.
- (2) Thirty-three HELLFIRE missiles were fired in the operational test completed il July 1980. A combination of direct, indirect, rapid and ripple firing modes was used in a battlefield environment which included dust and smoke. The Independent Evaluation Report published in May 1981 shows Results of the HELLFIRE operational test live firings are:
 - (U) System reliability
 33 Missiles launched
 3 Scored no-test (See Note)
 3 Scored missile failure
 27 Scored reliable out of 30
 Reliability = 90%

Accuracy given a reliable missile

Note: (U) Missiles were scored as "no test" due to limitations of the surrogate launch system, the AH-1 (COBRA), and laser false targets.

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(3) (U) All four HELLFIRE missiles fired during MULE OT II were direct hits. Two of the firings were from the lightweight launcher (paragraph 2c.(2)).

- (4) (U) A total of 12 HELLFIRE missiles were fired during AAH OT II. Results are as follows:
- (U) System reliability
 - 12 Missiles launched
 - 1 Scored no-test cockpit procedures
 - 11 Scored reliable out of 11 Reliability = 100%

Accuracy given a reliable missile

- (5) (U) One add'tional missile was fired from the AAH by USMC pilots subsequent to OT II. This firing was part of a quick-look by the Marine Corps at the AAH. The missile was a long-range direct fire round and resulted in a direct hit.
 - c. (U) Description of Equipment being tested.
- (1) (U) The HELLFIRE missile system is a high-explosive antitank (HEAT) missile with a laser seeker, fire control system, launchers, and container. The HELLFIRE launcher carries four missiles.
- (2) (U) The HELLFIRE missile tested in the engineering development program has no significant differences from the planned production hardware configuration. The launcher for production will be the lightweight version which is minus the gas storage system for cooling IR detectors for follow-on seekers. The lightweight launcher will be capable of being modified, if follow-on seekers are developed.

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- d. (U) All HELLFIRE subsystems and support equipment were available during the required test period.
- e. (U) Developing/Testing Organizations. Same agencies listed in paragraph E.l.e.
- f. (U) Major test facilities Operational Testing (OT) was conducted at Hunter Liggett Military Reservation. Tests were conducted by government personnel with participation by contractor personnel.
- g. (U) Overall test program schedule Operational Testing (OT) was conducted May-July 1980, and AAH OT II was conducted June-August 1981. The results of those OTs are discussed in subparagraph E.2.b. above.
- h. (U) Operational tests have been conducted with the current HELLFIRE prototype missile which will be the same as the production missile.
 - 1. A wide variety of possible countermeasures including

have been studied. Work will continue in conjunction with the Electro-Optical Guided Weapons CM/CCM Joint Test and Evaluation Directorate to evaluate and incorporate CM/CCM as needed.

j. (U) A missile reliability point (in flight) estimate of .95 has been demonstrated on Engineering Development firing attempts to date. The Materiel Need (MN) requirement band is .92-.95. Reliability verification includes a test-to-failure program to determine the reliability design margin of critical missile system components and assemblies. The laser seeker program includes a reliability mean-time-between-failure demonstration test. All valid flight test data from the development program is scored for reliability. The development program also includes a formal maintainability demonstration utilizing trained military personnel.

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3. System Characteristics:

Operational/Technical Demonstrated Performance Characteristics Objectives. Range Direct Fire Indirect Fire Time of Flight 3 Kilometers 5 Kilometers Probability of Hit (Given Reliability) Stationary Targets Moving Targets

Missile Weight, Max Missile Reliability

(in flight)

98.5 pounds .92-.95

99.8 pounds .95

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Title: PERSHING II Program Element: #6.63.11.A Budget Activity: #4 - Tactical Programs DOD Mission Area: 1242 - Theaterwide Nuclear Warfare A. (U) RESOURCES (PROJECT LISTING): (\$ in Thousands) Total FY 1981 Project FY 1982 FY 1983 PY 1984 Additional Estimated Title TOTAL FOR PROGRAM ELEMENT **Estima**te Estimate Estimate Coat 673394 * To Completion Number 149377 150580 111301 23598 QUANTITIES 24** 10 0

150580

149377

D599

PERSHING II

* Does not include \$18.0M received from AF PE 6.33.17.F (Theater Ballistic Missile Program) in FY 1979. ** Includes six ground test missiles.

111301

23598

99

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: PERSHING II is an evolutionary modernization of the currently deployed PERSHING Is system. PERSHING II will provide vastly improved performance over PERSHING Is: increased range versus; higher accuracy versus; use of lower yield warheads, thereby reducing unwanted collateral damage/civilian casualties; increased versatility through the use of the airburst/surface-burst warhead; superior military effectiveness and survivability; and manpower savings. The PERSHING II development includes an improved maneuverable reentry vehicle which includes radar terminal guidance; new propulsion sections to achieve the longer range and ground support equipment changes that provide enhanced system reliability, accuracy and targeting flexibility; plus reduced operating and support costs. Five missile flight tests were conducted during the Advanced Development phase in FY 1978. Based on the success demonstrated during these tests, the system was approved to enter Engineering Development in FY 1979. Deployment to Europe is planned to begin in December 1983. PERSHING II is planned to be the ballistic component of the NATO Long-Range Theater Nuclear Force (LRTNF) modernization based on extensive negotiations with the NATO Alliance. The rapid fielding of PERSHING II is a program of national urgency needed to fill the

673394 *

Program Element: #6.43.11.A

DOD Mission Area: #242 - Theaterwide Nuclear Warfare

Title: PERSHING II

Budget Activity: #4 - Tactical Programs

land-based ballistic missile void in the NATO LRTNF. This is particularly critical in view of the unilateral expansion of the Soviet threat to NATO epitomized by the SS-20 missile and the Backfire bomber. In addition, there appears to be a continuing trend on the part of the Soviet Union and non-Soviet Warsaw Pact (NSWP) countries to harden their military installations, necessitating increased accuracy in weapons to effectively defeat them. The Soviet/NSWP buildup is independent of NATO actions because their buildup has preceded NATO LTNNF modernization by several years. In recognition of the critical need for PERSHING II, the President has designated the system a program of highest national priority.

C. (U) BASIS FOR FY 1983 RDTE REQUEST: During FY 1983, environmental testing will be completed and operational ground testing will be conducted. The maintenance demonstration and operational test training will also be conducted during this period. The integrated test program hardware will be manufactured on production hard tooling using production procedures and methods. This tooling will also be used in production since the line will remain open and in continuous operation between the ED prototype units and the production units. The Engineering Development phase will culminate with the completion of prototype fabrication and 18 missile flights. The second production buy will occur in FY83, and the Initial Operational Capability (IOC) in Europe will occur in December 1983, providing US troop units in Europe and the Continental United States with a modernized system designed to meet the threat of the 1990's.

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DOD Mission Area: #242 - Theaterwide Nuclear Warfare

Title: PERSHING II
Budget Activity: 44 - Tactical Programs

	Current	Milestone Dates		
Major Milestones	Milestone Dates	Shown in FY 1982 Submission		
Start Development Test I	Nov 77	Nov 77		
Complete Development Test I	May 78	May 78		
Defense Systems Acquisition Review Council JI	Dec 78	Dec 78		
Award Engineering Development				
Contracts	Feb 79	Feb 79		
Start Integrated Flight Testing	Apr 82	Apr 82		
Long-Lead Procurement	Dec 81	Dec 81		
Defense Systems Acquisition Review	Jun 82	Jun 82		
Start Full-Scale Production	Jun 82	Jun 82		
Production (Buy 2)	Oct 82	Oct 82		
Complete Development/Operational				
Testing	May 83	Aug 83		
Initial Operational Capability	Dec 83	Aug 83		
Production (Buy 3)	Oct 83	Oct 83		
Production Deliveries Complete	Dec 88	Jul 86		

The change in the production deliveries complete milestone from the last submission results from contractor production proposals which are higher than anticipated. The change in completion of testing milestone results from a reduction in the 28-missile flight test program to an 18-missile program. This reduction is made possible because of early integration of the user/operational tester in the initial missile flights making 10 of the programed 14 operational test flights unnecessary.

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DOD Mission Area: #242 - Theaterwide Nuclear Warfare

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
RDTE					
Funds (Current Requirements)	149337	150580	111301	23697	673394 *
Funds (as shown in FY 1982 submission)	147378	151052	106895	22771	666780 *

* Does not include \$18.0 million received from AF PE 6.33.17.F (Theater Ballistic Missile Program) in FY 19 9. The change from the FY 1982 submission reflects the adjustment to incorporate a more realistic rate of inflation and reprograming to accommodate unanticipated flight instrumentation costs at White Sands Missile Range, NM (WSMR).

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Title: PERSHING II
Budget Activity: #4 - Tactical Programs

OTHER APPROPRIATION PUNDS: (\$ in thousands)

	FY 1981 Actual	PY 1982 Estimate	PY 1983 Estimate	PY 1984 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army: Funds (current requirements)	1900	221600	508600	431100		
Funds (as shown in FY 1982 submission)	1900	207700	349800	321600		
Quantities (current requirements)	0	21	91	95		
Quantities (as shown in FY 1982 submission)	0	39	134	142		
Military Construction, Army Funds (current requirements)	3900	0	o	0	o	3900
Funds (as shown in FY 1982 submission)	0	0	0	0	0	0

Change from FY 1982 submission reflects a more realistic inflation projection and increases in the program caused by higher than expected contractor proposals. The MCA funding was reprogramed from FY 1981 sources for the construction of a PER UNG long-range launch site near Boise, Idaho.

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

DETAILED BACKGROUND AND DESCRIPTION: In order to meet the Supreme Allied Commander, Europe's (SACEUR's) expressed need for an improved, mobile, surface-to-surface missile system, a Special Task Force was formed in January 1973 to validate the need for an Improved PERSHING system and to develop a Concept Formulation Package for the system. In October 1973 the Decision Coordinating Paper (DCP) for PERSHING II was presented to and approved by the Army Systems Acquisition Review Council (ASARC) and forwarded to the Defense Systems Acquisition Review Council (DSARC) on 22 January 1974. As a result of a favorable DSARC recommendation, the Deputy Secretary of Defense directed the Army to proceed with the Advanced Development (AD) of PERSHING II. Five missile flight tests were conducted during the AD phase in FY 1978. These flights demonstrated the capability of the new terminal guidance technique to achieve the required system accuracy. All objectives of the AD program were met. The Army, on 18 July 1978, conducted an ASARC II and concluded that PERSHING II was ready for Engineering Development (ED). In the FY 1980 Amended Program Decision Memorandum (APDM), the Secretary of Defense directed the Army to proceed to DSARC II as soon as possible with the extended range option of PERSHING II. A DSARC II was conducted 21 December As a result, the program was authorized to proceed into ED with extended range PERSHING II and two warheadsairburst/surface burst and an earth penetrator. This directed extended range decision represents a substantial increase in over the currently fielded PERSHING la (Pla) version. A contract was awarded to the the range PERSHING prime contractor in February 1979 for engineering development of the PERSHING II program. The FY 1982 APDM canceled funding for the earth penetrator warhead program in FY 1982 and beyond based on budget constraints and priorities. The Army is supporting Department of Energy efforts in FY 1981 to conclude the program in a logical manner. PERSHING II, a product improvement of the currently fielded PERSHING system, uses a new propulsion system to accommodate the greater range and modified ground support equipment that eliminates and/or consolidates hardware to reduce firing platoon response times by a factor of more than 50%, achieve greater flexibility, and reduce operating personnel. PERSHING II incorporates a new reentry vehicle that uses Radar Area Correlation Terminal Guidance to provide accuracy in the range of Circular Error Probable (CEP). This high accuracy represents an order of magnitude improvement over the currently fielded Pla system and provides the capability to effectively use low yield or specialized warheads. During the Engineering Development phase, the tactical configuration of the reentry vehicle, propulsion stages, and ground support equipment will be developed, fabricated and tested. This phase will culminate with the firing of 18 missiles during the integrated user/developer flight test program. During FY 1978, significant factors were illuminated by the North Atlantic Treaty Organization (NATO) High Level Group discussions on Theater Nuclear Forces Modernization.

They prefer an evolutionary approach, such as PERSHING. Thus, PERSHING II offers an opportunity to introduce improved Theater Nuclear Porce capability with minimum adverse political involvement. Based on the NATO high Level Group recommendation, SACEUR's stated need, existing policy and weapons available, PII has been identified as a

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

system to insure consistency with the DOD Nuclear Policy and provide improved military effectiveness for the Long-Range Theatre Nuclear Force (LRTNF). PERSHING II will have a range capability from 100 to thus providing an immediately responsive firing capability covering the region from the forward edge of the battle area into the Western Military Districts of the Soviet Union. PERSHING II is a mobile, survivable ballistic missile with terminal guidance that provides rapid response, assured penetration to the target area, high accuracy, minimum collateral damage, and thus the ability to attack mobile and fixed time-sensitive targets. PERSHING II has a rapid retargeting capability that makes it responsive to both the SACEUR and the Theater Army Commander. Initial Operational Capability (IOC) in Europe is planned for December 1983. Mobility and survivability are improved because of decreased ground support equipment which improves employment flexibility.

- G. (U) RELATED ACTIVITIES: Close coordination is maintained with the Air Force on advanced ballistic reentry developments. Prior year efforts in surface-to-surface missile PERSHING (Program Elements (PE) 2.21.62.A and 2.22.54.A) and Radar Area Correlation (PE 6.33.06.A) under the US Army Materiel Development and Readiness Command have been conducted by the same Project Manager (PM) selected to develop this project. These efforts have been closely coordinated with the US Army Missile Command funded under PE 6.23.03.A, Missile Technology. This program is coordinated with all Services by the Office of the Secretary of Defense (OSD). The technology employed in PERSHING II terminal guidance is unique to PERSHING. PERSHING II is responsive to targeting requirements from the forward edge of the battle area to its maximum range. This, pulse its tactical mobility which provides sustained operations without constraining dependence on a main operating base, makes the system unique.
- H. (U) WORK PERFORMED BY: US Army Missile Command, Redstone Arsenal, AL; White Sands Missile Range, NM; Martin Marietta, Orlando, FL; Goodyear Aerospace Corporation, Akron, OH; Singer Company (Kearfott Division), Little Falls, NJ; Bendix Corporation (Navigation and Control Division), Teterboro, NJ; and Hercules, Inc., Salt Lake City, UT.

I. (U) PROGRAM ACCOMPLISHMENTS AND PUTURE PROGRAMS:

1. FY 1981 and Prior Accomplishments: The PERSHING II program started in FY 1975. The primary effort during that year was directed toward design of the reentry vehicle (RV) for the missile flight program in FY 1978. The RV underwent design changes during FY 1975 as a result of the Radar Area Correlation fixed-wing flight demonstration program. The US Army Armament Research and Development Command, Dover, NJ, was tasked with the responsibility for developing the adaption kit for the airburst/surface-burst warhead section. The Department of Energy (DOE) was tasked with developing the earth

Title: PERSHING II

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penetrator warhead. The earth penetrator integrated design, less nuclear physics package, was completed and successfully tested at high velocities into hard targets. The major prototype missile components were delivered; RV fabrication and ground/captive testing was completed for the Adwanced Development (AD) missile flight hardware. The five-missile flight demonstration program was conducted in FY 1978. The capability of the Radar area Correlation Guidance Systems to attain the desired accuracy in a missile flight environment was proven during AD culminating with flight five, which recorded a

miss distance. The payload was an earth penetrator (EP) vehicle, and the capability of the EP to withstand missile flight environments, impact, and penetration was also demonstrated. All PERSHING II Advanced Development objectives were set. Defense Systems Acquisition Review Council (DSCARC) II was held in December 1978 and gave approval for entering into engineering development. The Engineering Development (ED) contract was swarded to the PERSHING prime contractor in February 1979. Design of ED prototype critical hardware was initiated in FY 1979. The initial phase of ED wind tunnel testing was conducted during FY 1979, and preparation for fixed-wing captive tests was initiated. During FY 1980, fixed-wing captive filight tests were conducted to evaluate the correlator hardware. Prototype air vehicle and Ground Support Equipment (GSE) material procurement was initiated, and reentry vehicle prototype fabrication was started. The wind tunnel program initiated in FY 1979 continued, and the development test on the propulsion sections was initiated. Procurement of tooling material occurred, and fabrication of production tooling was initiated. Hajor design effort was initiated on the Reference Scene Generation Facility (RSGF) and the airburst/surface burst warhead adaption kit with award of contracts by Engineering Topographic Laboratoy and Army Armament Research and Development Command, respectively. In February 1980, the President granted PERSHING II a BRICKBAT (DX) status, making it a program of highest national priority. In FY 1981, prototype procurement activities were completed and fabrication of the prototype ground support equipment was initiated. Fabrication of the Reentry Vehicle and propulsion section continued, and prototype testing was initiated.

- 2. (U) FY 1982 Program: During FY 1982, fabrication of the prototype ground support equipment will be completed, and fabrication of the missile will continue. The first six of the planned 18 integrated user/development test missile flights will be conducted during this period. Long-lead procurement for the production phase will be conducted early in FY 1982, and following OSD review, the full-production decision will be made.
- 3. (U) FY 1983 Planned Program: The ED phase will culminate in FY 1983 with the completion of the 18 user/developer missile flights. The DT/OT II hardware will be made on production hard tooling, and this tooling will be used in the production program. The line will remain open and in continuous operation between the Engineering Development prototype units and the production units. The second production buy will occur in FY 1983, and the Initial Operational Capability (IOC) in Europe will occur in December 1983.

Program Element: #6.43.11.A

DOD Mission Area: #242 - Theaterwide Nuclear Warfare

Title: PERSHING II
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4. (U) FY 1984 Planned Program: A third production buy will occur in FY 1984.

5. (U) Program to Completion: Additional buys will occur in FY 1985 through FY 1986 to provide PERSHING II hardware for deployment of all PERSHING II battalions and support the general missile firing programs.

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Program Element: #6.43.11.A

DOD Mission Area: #242 - Theaterwide Nuclear Warfare

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

J. (U) TEST AND EVALUATION DATA:

- 1. (U) Development Test and Evaluation:
- a. (U) During the engineering development phase of the PERSHING II Development Program, extensive testing will be conducted. Development testing will include the following:
- (1) (U) Wind tunnel testing Wind tunnel testing is conducted to verify the aerodynamic characteristics of the missile design. The first phase ended in July 1979, and the second phase ended in October 1981. No design difficulties have been identified as a result of the tests.
- (2) (U) <u>Fixed-wing captive tests</u> In order to simulate the missile reentry environment (with the exception of velocity), the <u>PERSHING II reentry vehicle</u> pod is attached to the wing on an aircraft and dived at targets. These tests are conducted to verify that the correlator can schieve the required accuracy and verify that reference scenes are adequate for correlation. The first captive test phase was completed in April 1980. Test sites for the first phase included the Orlando, Florida, area, White Sands Missile Range (WSMR), the Watertown, New York, area, and the Huntsville, Alabama, area. These tests were highly successful. The second phase started in October 1981 using prototype hardware. This phase will continue through FY82 and will include the Pope AFB, North Carolina, area in addition to the areas noted above.
- (3) (U) Environmental tests System environmental testing will be initiated in March 1982 and continue through May 1983. These tests will include road shock and vibration, high-low temperature, temperature shock, humidity, wind, rain, EMP, etc. The purpose of these tests is to verify that the system remains operational throughout various specified environments.
- (4) (U) Integrated User/developer flight test Eighteen missiles will be flown in the integrated user/developer flight test program. These tests will start in April 1982 and will be flown against short-, medium-, and long-range targets. These tests will demonstrate the capability of the system to achieve the required accuracy and range as well as testing the airburst/surface-burst warhead adaption kit in a flight environment. The tests will be a combined user/developer program which will phase the user into control of the test missiles early in the test sequence.

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Program Element: #6.43.11.A

DOD Mission Area: #242 - Theaterwide Nuclear Warfare

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

- b. (U) During Advanced Development system test and fixed-wing captive tests were conducted in preparation for five Advanced Development (AD) missile flights. The missile flights were conducted at White Sands Missile Range, NM, using an earth penetrator warhead as the payload. The planned sixth flight was canceled because of the success demonstrated through flight five. All flights were tested at a range of 60 nautical miles, since the combination of inertial and radar correlation guidance techniques is independent of range. While quality problems were experienced, the overall flight test program at White Sands Missile Range was successful.
- c. (U) Due to the low density of the PERSHING Weapon System, the engineering development prototype hardware will be made on production tooling. Therefore, the prototype hardware used in the DT/OT II flight test program, and in testing prior to the flight test program, will be the production configuration. The hardware tested during this program includes the missile (reentry vehicle, first and second stage propulsion section) and ground support equipment (erector launcher, Platoon Control central, reference scene generation facility, system component test station, etc.).
- d. All subsystems and support equipment will be available during system tests. Therefore, no make-up testing will be required.
- e. (U) The prime contractor for PERSHING II, is Martin Marietta Aerospace, Orlando, FL, and as such, they will be responsible for the development and testing of PERSHING II. The PERSHING program is managed by the PERSHING Project Manager, COL William Fiorentino, of the Army Missile Command, Redstone Arsensi, AL. The independent test and evaluation agencies for PERSHING II will be the Army Materiel Systems Analysis Agency (AMSAA) and the Army Operational Test and Evaluation Agency (OTEA). OTEA will perform both ground and flight tests as described in paragraph 2 below.
- f. (U) All testing, with the exception of the OTEA ground test, flight test, wind tunnel test, and fixed-wing captive test, will be at the contractor/developer facility. Facilities for the excluded tests are:

Test

Facility

Fixed-Wing Captive Test

White Sands Missile Range (WSMR), NM Huntsville, AL Watertown, MY Pope AFB, NC

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Program Element: #6.43.11.A

DOD Mission Area: #242 - Theaterwide Nuclear Warfare

Title: PERSHING II

Budget Activity: #4 - Tactical Programs

Orlando, FL

Wind Tunnel Test

LTV, Dallas, TX AEDC, Tullahoma, TN Naval Systems Weapon Center

Test

OTEA Operational Assessment

OTEA Ground Test (OT III)

Missile Flight Test

Facility

Orlando, FL

Fort Sill, OK

Eastern Test Range, FL WSMR

Troops to perform the OTEA ground test and the flight tests will be from the PERSHING Battalion at Ft. Sill, OK. Contractor personnel will conduct the DT portion of these tests with government participation.

g. (U) All testing from component testing to captive flight tests is conducted in preparation for the 18-missile flight test program. The major tests with planned spans are shown below:

Jan 79 - Jul 79 Oct 79 - Feb 81 Wind Tunnel (Phase I) Wind Tunnel (Phase II) Sep 79 - Apr 80 Captive Test (Phase I) Captive Test (Phase II) Oct 81 - Sep 82 **Environmental Test** Mar 82 - May 83

Integrated Flight Test Program Apr 82 - Feb 83

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Program Element: #6.43.11.A

DOD Mission Area: #242 - Theaterwide Nuclear Warfare

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Operational Assessment

Jul 82 - Aug 82

Operational Ground Test

Feb 83 - Mar 83

- h. (U) 18 missile firings are planned at the end of the ED program. In addition, six ground missiles are planned for ground test purposes. Eight erector launchers, four Platoon Control Centrals, four reference scene generation facilities, and four system component test stations are also planned for tests during the ED phase.
- i. (U) The currently planned missile firings for the integrated user/developer test flight program scheduled for April 1982 through May 1983 are as follows:

Flight No.	Range	Configuration		
1 - 2	Long	2 Stage		
3 ~ 4	Short	2 Stage		
5 ~ 6	Short	l Stage		
7 ~ 11	Long	2 Stage		
12 - 15	Medium	l Stage/2 Stage*		
16 - 18	Long	2 Stage		

- *2 single missiles and 2 two-stage missiles.
 - j. (U) PERSHING II has not been tested by other DOD components.
 - k. (U) No system retest has been conducted or is anticipated.
- 1. (U) Reliability assessments will be conducted using the data obtained from all testing conducted during the Engineering Development program. This assessment started with the Phase I captive test results and will progress throughout the test program, concluding with the 18 missile flights. A reliability growth curve for PERSHING II has been constructed with the goal of obtaining the minimum required reliability assessment prior to the development missile firings. Maintainability is a parameter that is constantly considered in any design decision on PERSHING II. A maintainability

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demonstration and evaluation, planned for late 1982, will be conducted by the contractor and monitored by TECOM/AMSAA. The demonstration/evaluation will use prototype hardware from production tooling, and as stated above, that is of the production configuration.

- m. (U) Units for development test, operational test and production requirements will be produced on the same "hard" production tooling and will be of the same configuration.
- n. (U) Extensive environmental testing will be conducted on the missile and ground support equipment. These tests will include road shock and virbration, high-low temperature, temperature shock, humidity, wind, rain, EMP, etc. These tests will be conducted by the contractor.

2. (U) Operational Test and Evaluation:

- a. (U) OTEA, the independent operational tester and evaluator for PERSHING II, has access for monitoring purposes to all testing conducted during engineering development. OTEA will also conduct an independent operational ground test of PERSHING II. OTEA will have full independence and control over the ground test. In addition, OTEA will conduct a limited operational ground test of the PERSHING II hardware in July 1982 and an assessment of the Reference Scene Generation Facility in May 1982 in order to provide an early operational assessment of the system.
- b. (U) During Advanced Development, OTEA concluded that Opertional Test I (OT I) was not necessary. However, OTEA did participate in the DT I tests by observing with a broad view toward refining operational issues. OTEA has reviewed DT I test data and concurred that the system was ready to enter engineering development. While no operational testing has yet been conducted by OTEA in Engineering Development, they have monitored ED testing to date to identify operational issues.
 - c. (U) Hardware planned for test by OTEA will be of production configuration using "hard" production tooling.
- d. (U) OTEA ground tests will use facilities at Ft Sill, OK, Orlando, FL, and White Sands Missile Range, NM. Troops from the PERSHING Battalion at Ft Sill will be used in conducting these tests.
- a e. RAM assessments will be made by OTEA after the production decision based on the integrated flight testing and the operational ground tests.

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Title: PERSHING II
Budget Activity: #4 - Tactical Programs

- f. (U) As directed by the Secretary of Defense, the PERSHING II program is currently pursuing a schedule that results in an acceleration of the IOC by 12 months. This acceleration is accomplished by obtaining full-production approval after the first tests. OTEA participation prior to the production decision is limited to observing the first two flight tests and providing an operational assessment of the Reference Scene Generation Facility. OTEA testing will be conducted per the schedules shown above.
- h. (U) PERSHING II is an evolutionary improvement to the currently fielded Pla system. Therefore, PERSHING II is not unlike PERSHING Ia, and a great deal of operational information is available.
 - 3. System Characteristics: Selected operational and technical characteristics are as follows:

Operational/Technical Characteristics	Objectives .	Demonstrated Performance		
Maintainability (mean time to repair)	0.8 - 1.5 hr	To be determined		
Range Requirements	100 - km	To be determined		
Accuracy	CEP	Less than		

1/ Capability demonstrated in captive and missile flight tests during Advanced Development and captive tests during Engineering Development.

PY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.13.A DOD Mission Area: #222 - Ground-Based Antiair and

Title: GRASS BLADE
Budget Activity: #4 - Tactical Progress

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

Tactical Missile Defense

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 43713	FY 1982 Estimate 29826	FY 1983 Estimate 17117	FY 1984 Estimate 9546	Additional To Completion 8466	Total Estimated Costs CLASSIFIED
D112	GRASS BLADE	43713	29826	17117	9546	8466	CLASSIFIED

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Program content is SECRET "Limited Distribution Special Access Required," precluding further description in this summary. Access to GRASS BLADE information is controlled by the Deputy Chief of Staff for Research, Development, and Acquisition, Department of the Army.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: Continue RDTE effort.
- D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	43713	29826	17117	18017	CLASSIFIED
Funds (as shown in FY 1982 submission)	46713	29919	Not Shown	Not Shown	Not Shown

Details on funding increases are available upon request in accordance with paragraph B above.

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Program Element: #6.43.13.A

DOD Mission Area: #222 - Ground-Based Antisir and
Tactical Missile Defense

Title: GRASS BLADE
Budget Activity: #4 - Tactical Programs

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

·	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army: Funds (current requirements) Funds (as shown in FY 1982	32500	0	0	To be dete	rmined	To be determined
submission)	11100	100200	292900	Not Shown	Not Shown	404200

Details on procurement increases and decreases are available upon request in accordance with paragraph 8 above.

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Program Element: #6.43.15 A

DOD Mission Area: #222 - Ground-Based Antiair and
Tactical Missile Defense

Title: GRASS BLADE Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: Program content is SECRET "Limited Distribution Special Access Required," precluding further description in this summary. Access to CRASS BLADE information is controlled by the Deputy Chief of Staff for Research, Development, and Acquisition.
- G. (U) RELATED ACTIVITIES: This project is related to work in other Army technology programs. Duplication of effort is avoided due to access to the project being strictly controlled and limited to specific service and Department of Defense individuals involved in managing related technologies.
- H. (U) WORK PERFORMED BY: Details on primary contractors provided upon request in accordance with paragraph B and F above. In-house agency is US Army Missile Command, Redstone Arsenal, AL.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROCRAMS: Details may be provided upon request in accordance with paragraph B and F above.

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.14.A

DOD Mission Ares: #212 - Indirect Fire Support

Title: Multiple Launch Rocket System (MLRS)
Budget Activity: #4 - Tactical Programs

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

Project Number	Program Element Title TOTAL PROGRAM ELEMENT	FY 1981 Actual 69925	FY 1982 Estimate 38172	FY 1983 Estimate 23215	FY 1984 Estimate	Additional to Completion	Total Estimated Cost 324733
D564	Multiple Launch Rocket System	69925	38172	23215	0	0	324733 <u>1</u> /
	Quantities: ROCKET/SPLL 2/	0/0	0/0	0/0	0/0	0/0	504/10

- 1/ (U) US share only. Addition of allied share (\$30000) increases total to \$354733.
- 2/ (U) Self-propelled launcher loader.
- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The MLRS is a free-flight, area fire, artillery rocket system being developed to offset the existing deficiency in conventional fire support. The primary mission is counterfire and suppression of enemy air defenses. It supplements cannon artillery fires by delivering large volumes of firepower in a short time against critical, time-sensitive targets. The basic warhead carries improved conventional submunitions. The Germans, one of four partners in an international development program, are developing a scatterable mine warhead. Growth potential exists to add a Terminal Guidance Warhead (TGW)--to defeat armor--and a binary chemical warhead. Activities leading to a joint United States/United Kingdom/Germany/France Concept for a TGW Program definition were initiated in FY 1980 under the

Program Element: #6.43.14.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Multiple Launch Rocket System (MLRS)
Budget Activity: #4 - Tactical Programs

terms of the MLRS Memorandum of Understanding, signed in July 1979. A supplement to the MLRS MOU covering the initial phase, Concept International Program Definition (C/IPD) was negotiated and concluded. It was signed by all four governments representatives in September 1981.

C. (U) BASIS FOR FY 1983 RDTE REQUEST:

- 1. (U) Continuation of Maturation R&D which is being conducted concurrently with low-rate production. Maturation Research and Development will include the completion of Production Qualification Tests (PQT), live firing tests, Force Development, Test and Experimentation (FDTE) and Operational Test III (OT III).
 - 2. (U) A comparison of current milestones with those shown in the FY 1982 summary is shown below.

Major Milestones	Current	Milestone Dates			
	Milestone Dates	Shown in FY 1982 Submission			
Start Operational Test (OT)	Dec 79	Dec 79			
Complete Development Tests/OT	Feb 80	Feb 80			
Army Systems Acquisition Review					
Council (ASARC) III	Apr 80	Apr 80			
Defense Systems Acquisition Revi	lev .				
Council (DSARC) III	May 80	Hay 80			
Maturation/Produc Contract	•				
Award	Apr 80	Apr 80			
Complete Production Qualification	ons				
Test	Feb 83	Sep 82 3/			
ASARC IIIA	Feb 83	Sep 82 3/			
DSARC IIIA	Mar 83	Nov 82 3/			
Initial Operational Capability					
(10C)	Mar 83	Nov 82 3/			
• •					

3/ (U) Milestone change due to FMC (SPLL carrier vehicle manufacturer) strike.

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Program Element: #6.43.14.A
DOD Mission Ares: #212 - Indirect Fire Support

Title: Multiple Launch Rocket System (MLRS)
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	PY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Costs
· · · · · · · · · · · · · · · · · · ·	69925	38172	23215	0	324733
Funds (as shown in FY 1982 submission)	68054	38291	17330	0	318373

4/ (U) The difference in FY 1981 is a result of \$500 thousand to pay for the addition of the Common Test Data Collection System (CTDCS), other program changes, and inflation adjustments. FY 1982 changes are due solely to inflation adjustments. FY 1983 change is due to a strike at FMC (6.3 million) and inflation adjustments.

E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands) 5/

	FY 1981 Actual	FY 1982 Estimate	PY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army Funds (current requirements) 6/	115600	205600	444400	584800	2397300	3812200
Funds (as shown in FY 1982 submission) $\frac{6}{}$	116500	204800	419800	N/A	3098500	3903200
Quantities (current requirements) Rocket/Launcher 7/	2340/32	2496/68	23640/72	36000/76	296982/73	362832/333
Quantities (as shown in FY 1982 submission) Rocket/Launchers	2340/32	2496/72	25968/72	N/A	330654/92	362832/276

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Program Element: #6.43.14.A

DOD Mission Ares: #212 - Indirect Fire Support

Title: Multiple Launch Rocket System (MLRS)
Budget Activity: #4 - Tactical Programs

- 5/ (U) Ammunition Resupply Vehicle and Trailer (HEMTT and HEMAT) are no longer managed as a part of the MLRS program. They are being procured by TACOM for other users in addition to MLRS; therefore they are not included in the MLRS Congressional Descriptive Summary (CDS).
- 6/ (U) Change in funding profile reflects multiyear contract acquisition strategy including funds for advance procurement. Profile also includes initial spares which were shown on a separate line in FY82 CDS submission.
- 7/ (U) Program quantities revised to support adjusted force structure. The FY82 summary was based on a force structure of Z6 batteries with 9 launchers each (276 launchers including training base and maintenance floats). Fifty-seven (57) additional launchers have been added for POMCUS stocks (new total 333 launchers).

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Program Element: #6.43.14.A
DOD Mission Area: #212 - Indirect Fire Support

Title: Multiple Launch Rocket System (MLRS)
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This MLRS is the result of a continuing effort begun in FY 1971. In a study of the 1980-1990 battlefield, the Institute for Land Combat and the Army Materiel Concept Agency identified the need for a rapid-fire, area-saturation weapon system. A Training and Doctrine Command Joint Working Group was established in February 1974 to assess the use of an kLRS for counterbattery fires and suppression of enemy air defense. In order to expedite a decision on the proposal to develop an artillery rocket system, the Assistant Secretary of the Army (R&D) requested that the Army conduct a design and evaluation study of future artillery capabilities. This study, Task Force BATTLEKING, was completed in December 1974. The conclusions reached indicated that improvements were needed if artillery was to provide effective counterfire, efficient attack of deep targets, responsive direct support fires, and fires to disrupt the enemy's command, control, and maneuver. One of the weapons judged to be capable of making a major contribution toward improvement of the field artillery system was MLRS. These study efforts led to concept development and a technology demonstration of the KLRS. In December 1975, a Special Study Group was organized to conduct an in-depth investigation of the MLRS concepts, atudy possible alternative systems, and recommend an approach to fulfill the system need. The study was completed in November 1976. The conclusion reached was that the addition of an MLRS to the artillery force would be more cost and operationally effective than any other alternative considered. In February 1977, the Secretary of Defense authorized the Army to proceed with the development of the MLRS with a dual-purpose improved conventional munition warhead.

G. (U) RELATED ACTIVITIES:

- 1. (U) Terminal Guidance Warhead (TGW): Development of the Terminal Guidance Warhead for the MLRS continues under Program Element 6.33.03.A, Project D216. The Defense Advanced Research Projects Agency "Assault Breaker" demonstrations provide a technology baseline for both the MLRS 1GW and the Army's Corps Support Weapon System antiarmor warhead. The IGW effort is managed by the MLRS Project Manager, and under the provisions of the quadrilaterally approved Memorandum of Understanding (MOU), the program is planned as a joint development (US/UK/GE/FR) through Concept Definition Phase. On the IGW program is planned into the Demonstration and Validation phase. A separate MOU Supplement must be negociated to continue the quadrilateral international program.
- 2. (U) Heavy Expanded Mobility Tactical Truck (HEMTI): Procurement of 480 trucks with trailers (HEMAT) is being accomplished by the Commander, Tank-Automotive Command. This effort was originally included in the MLRS program element. Each of these 10-ton resupply vehicles with trailers is designed to carry 8 launch pod containers each containing six rockets.

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Program Element: #6.43.14.A

DOD Mission Area: #212 - Indirect Fire Support

Title: Multiple Launch Rocket System (MLRS)
Budget Activity: #4 - Tactical Programs

- 3. (U) Chemical Warhead: A Letter of Agreement (LOA) between HQ, DARCOM and HQ, TRADOC dated 21 March 1981 initiated the US unilateral development of a chemical warhead for MLRS under Program Element 6.36.15.A, Project M463615, DE76. That warhead is being developed by the Chemical Systems Laboratory (CSL) and will be integrated by the MLRS prime contractor.
- H. (U) WORK PERFORMED BY: The US Army Missile Command, Redstone Arsenal, AL, has the overall responsibility for development of the MLRS. Vought Corporation of Dallas, TX, was selected as the prime contractor in May 1980. The Army also has contracts with FMC Corporation, San Jose, CA, for development of the self-propelled carrier vehicle. The warhead fuze is developed and produced by KDI Corporation, Cincinnati, OH, under the supervision of the US Army Electronics Research and Development Command at its Harry Diamond Laboratories, Adelphi, MD. The dual-purpose improved conventional munition is provided by the US Army Armaments Research and Development Command, Dover, NJ.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1981 and Prior Accomplishments: The Defense Systems Acquisition Review Council (DSARC) I actions were completed in January 1977. In February 1977, the Secretary of Defense authorized the Army to proceed with development of the MLRS. At the same time he also directed the Army to study alternatives to accelerate the acquisition process, to solicit NATO participation in the development, prepare a plan for development of terminal homing options, and investigate the potential to deliver scatterable mines. In April 1977, a special Army Systems Acquisition Review Council (ASARC) approved an accelerated development program which reduced the acquisition cycle from 84 to 63 months. Fuze development began in May 1977, and carrier development was initiated in June 1977. Competitive system development contracts were signed in September 1977. The program was restructured in January 1978 to enable the system to deliver the German-developed scatterable mine warhead. The Validation Phase was increased from 29 to 32 months and the RDTE cost increased about \$20 million in order to accommodate the new warhead. The Maturation Phase was simultaneously shortened to prevent any slip in the Initial Operational Capability date. On 14 July 1979, the US formally executed a Hemorandum of Understanding (MOU) with France, Germany, and the United Kingdom for joint development of the MLRS system. This agreement calls for the US to underwrite the United Kingdom during the FY80-82 period. The United Kingdom and France have made payments totaling \$10 million, and the last installment will be paid in April 1982. Germany's contribution to the joint development effort is to fund the development of the scatterable mine warhead. On 23 July 1980, the US and its three allied partners executed an agreement to negotiate the terms and conditions for joint development of a Terminal Guidance Warhead (TGM). All parties agreed to share the cost to support Concept Definition studies.

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- 2. (U) FY 1982 Program: During FY82, 66 maturation flight tests will be conducted and component qualification tests and major engineering design activities will be completed. Production Qualification flight tests will be started and Force Development Testing and Experimentation (which includes 54 flight tests) will be completed during this fiscal year.
- 3. (U) FY 1983 Planned Program: During FY83 the Production Qualification Tests (PQT), including 114 rocket flight tests, will be completed; Operational Test (OT) III, which includes 144 flight tests, will be conducted leading to Army Systems Acquisition Review Council (ASARC) IIIA, which will provide a Full-Scale Production decision. Also during FY83, Initial Operational Capability (IOC) will be achieved in the second quarter by fielding one firing battery.
 - 4. (U) FY 1984 Planned Program: RDTE program will be completed in FY 1983.
 - 5. (U) Program to Completion: RDTE program will be completed in FY 1983.

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J. (U) TEST AND EVALUATION DATA:

- 1. (U) Development Test and Evaluation:
 - a. (U) Test Phases:
- (1) (U) Validation Phase. Because the Validation Phase results also served as the basis for source selection, competitive testing between Boeing and Vought was more extensive than that normally required during a traditional Demonstration and Validation Phase. Testing was intended to demonstrate that all technical risks were identified, that solutions were schievable and to provide documented proof of the MLRS military utility and operational suitability. In addition to these objectives, competitive data were collected to support a decision to enter low-rate production. Validation Phase testing consisted of two subphases: Engineering Design Tests and Advanced Development Verification Tests.
- (a) (U) Engineering Design Tests (EDT). These tests provided reliability and safety data, determined natural and induced environmental effects, established performance levels, environmentally tested components, provided selected hazard analyses, and identified technical risks and schievable solutions. Contractor Engineering Design Tests (EDT-C) examined the feasibility of the MLRS hardware design. Components, subsystems and systems were tested to investigate the ability of the hardware design to satisfy the requirements of the system specification in a cost-effective manner. As problems were encountered, the components were improved and retested. Government Engineering Design Tests (EDT-G) included the tests of a number of critical parts, components, subsystems, and systems. These tests were performed by the government because of the unique government—owned test facilities and expertise required. Data from EDT-G were made available to respective contractor; and the independent evaluators.
- (b) (U) Advanced Development Verification Tests (ADVT). These tests provided human factors and ground support equipment performance data in a simulated arctic and desert environment; identified system emissions, effluents, and hazards; and required system demonstration flights. ADVT data were used by the independent government evaluators to officially score system performance and reliability.

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- 1 (U) Advanced Development Verification Tests-Contractor (ADVT-C). These tases verified that the design approach was capable of evolving into a ruggedized weapon system that could schieve necessary reliability and performance goals during the Maturation Phase. ADVT-C included performance testing of subsystems and systems plus flight tests. Self-Propelled Launcher Loaders (SPLL) with launch pod containers were exercised while exposed to high and low temperature extremes (+140, -25°F), high humidity, rain, sand, and dust, and icing conditions. The testing assured that the system was potentially capable of passing further Government testing (e.g., Government Advanced Development Verification Test and Operational Test 1).
- 2 (U) Advanced Development Verification Tests-Government (ADVT-G). The government tested subsystems and systems that were considered critical to individual design. ADVT-G provided the final quantitative data points and included ground and flight tests. Complete launch pod containers with rockets were subjected to tropic, arctic, and desert stockpile-to-target environmental life sequences, and the rockets were flight tested to demonstrate performance in extreme weather conditions. Additional rockets were flight tested to determine accuracy and effectiveness at the required minimum, intermediate, and maximum ranges. Launcher mobility and endurance tests were conducted for the purpose of collecting reliability, availability, and maintainability data for the independent government evaluators.
- (2) (U) Maturation Phase. The Secretary of Defense directed that special emphasis be placed on testing of built-in test equipment (BITE) to include additional testing and demonstration of hardware maintenance features. These tests, which have begun, are to be concluded in FY 1982. Also during this phase, testing will be conducted on all components/subsystems which were not fully tested or qualified during the Validation Phase; included are the software and hardware for the Position Determining System, Platoon Leader's Digital Message Device (PLDMD), Fire Direction System and integration with ancillary systems such as the automatic test equipment and the Heavy Expanded Mobility Tactical Truck (MEMIT) with Heavy Expanded Mobility Ammunition Trailer (HEMAT). Testing will also assure the adequacy of the system design as it is matured. Maturation Phase testing will be a joint contractor/government effort as opposed to independent contractor and government testing. The contractor will prepare test plans for government coordination and approval, conduct tests at contractor and government facilities, as appropriate, accommodate government test monitors, and use independent or mixed contractor/government test crews as test conditions warrant. Testing will consist of two phases: Maturation Development Tests and Production Qualification Tests.

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Title: Multiple Launch Rocket System (MLRS) Budget Activity: #4 - Tactical Programs

(a) (U) Maturation Development Tests (MDT). This test program will start with component evaluation and progress through total system demonstration. Test hardware will be produced by Vought in its low-rate production facility. The following tests will be included:

(U) Component/subsystem/system performance. (U) Rocket flight tests (including environmental). (U) Safety.

(U) Countermeasures.

(U) Electromagnetic radiation.

6 (U) Nuclear hardness.

(U) Human Factors.

(11) Maintainability demonstration.

<u>5</u> (U) Transportability.

10 (U) Component/subsystem qualification.

(U) Computer software.

 $\frac{11}{12}$ (U) Reliability.

- (b) (U) Production Qualification Tests (PQT). PQT will be jointly conducted by the contractor and the government using low-rate production hardware and will be divided into four categories: Environmental Qualification Tests, Rocket Performance Tests, Command, Control, Communications Tests, and Mobility and Endurance Tests.
- 1 (U) Environmental Qualification Tests. These tests are being designed to demonstrate performance and reliability of the design in simulated and actual operational environments. The Self-Propelled Launcher Loader and other end items will be tested in simulated arctic, temperate, desert, and tropic environments to demonstrate acceptable hardware and man-machine performance. The purpose of this test is to verify that MLRS will perform as required over the required operational extremes. The launch pod container and rockets will be subjected to environmental sequential testing and then fired in flight tests. Both the launch pod container and rockets will be temperature conditioned and flight tested to demonstrate performance at intermediate and extreme temperatures.
- 2 (U) Rocket Performance Tests. Rocket flight tests will demonstrate rocket and launch pod container reliability and accuracy versus range. Flight tests will be conducted at White Sands Missile Range using contractor, government, or mixed launch crews. Launch procedures will simulate tactical employment of MLRS.
- 3 (U) Command, Control and Communication Tests. This test program will use a Fire Direction System, a Platoon Leader's Digital Message Device, and three Self-Propelled Launcher Loaders (SPLLs) to demonstrate that the MLRS platoon is a totally integrated system and capable of performing its intended purpose. Testing will be conducted at Fort Sill, OK, to evaluate interoperability of the MLRS Computer Resources hardware/software in preparation for "user operational tests."

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Title: Multiple Launch Rocket System (MLRS)
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4 (U) Mobility & Endurance Tests. Mobility testing will be conducted with two production model Self-Propelled Launcher Loaders (SPLL) at Aberdeen Proving Ground, MD. Each SPLL will be tested over 6,000 kilometers to demonstrate reliability, availability, and maintainability.

b. (U) Test Summaries.

(1) (U) Rocket Flight Tests.

TEST	LOCATION	SCHEDULE	NUMBER	STATUS
Engineering Design Tests - Contractor (EDT-C)	White Sands Missile Range (WSMR)	Dec 77 - Dec 79		Nonscored
Advanced Development Verification Test - Contractor (ADVT-C)	WSMR	Sep 79 - Nov 79	36	One fin opening problem. Others were successful.
Advanced Development Verification Test - Government (ADVT-G)	WSMR	Nov 79 - Feb 80	48	Two fin opening problems; one pod cover problem; others were successful.
Operational Test (OT) I (performed by soldiers)	WSMR	Jan 80- Feb 80	24	All 24 were successful.
Early Maturation Flight Tests (contractor	WSMR (*)	Nov 80- Jan 81	6	Successful. Test objectives focused upon attaining correct warhead burst patterns.

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TEST	LOCATION	SCHEDULE	NUMBER	STATUS
Maturation Development Flight Tests	WSMR	Apr 81 - Mar 82	100	First 43 shots completed. Test objectives met. Results used to establish production configuration.
Production Qual Tests	WSHR	Apr 82- Nov 82	114	
Operational Test III	Fort Bliss, Texas	Oct 82 - Jan 83	144	
Developer/Opnl Flight Tests	WSHR	Nov 82- Jan 83	54	

(2) (U) Self-Propelled Launcher Loader (SPLL) Tests.

TEST	LOCATION	SCHEDULE	STATUS
Govt. Eng. Dev. Tests (Mobility & Endurance)	Aberdeen Proving Ground (APG), MD	Jul 79 - Sep 79	Test complete. No major problems were encountered.
Contractor Advanced Dev Verification Tests (Environmental)	Eglin AFB, PL	Jul 79 - Nov 79	Climatic testing and human factors tests were completed with no major problems.

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TEST	LOCATION	SCHEDULE	STATUS
Transportability	RSA	Feb 81	Complete, no problems.
EMR & Nuc PreQual	RSA/Sandia	Mar 81- Apr 81	Complete, no major problems.
CM PreQual	WSMR	Jan 81	Complete, no problems.
Environmental PreQual (SPLL)	Eglin AFB	May 81- Jul 81	Completed. No major problems.
Command, Control and Communication tests to verify hardware and software compatibility.	Fort Sill	Feb 82- May 82	
Production Qualification Tests	WSMR, Eglin AFB APG, RSA	Apr 82- Feb 83	
Operational Test III	Fort Bliss, Texas	Oct 82- Jan 83	

(3) (U) Summary:

(s) (U) Validation Phase: Development testing was completed on schedule. The planning, conduct and results of the contractor Engineering Design Tests were closely monitored by the government but were not evaluated for reliability and accuracy. During this testing, the total system was demonstrated. Firings included single, double, triple, and six-round ripple firings. Design changes were made to the rocket as a result of data collected during this phase. Government-scored firings began with the Advanced Development Verification Tests. All scored tests were conducted in accordance with the government-approved test plan. Developmental testing conclusively demonstrated that the MLRS system was ready to enter a

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Maturation Phase and concurrent low-rate production. These conclusions were affirmed at the DSARC III in May 1980, and Vought Corporation was selected as the prime contractor. The following data relate to the performance of the launcher and rocket:

- 1 (U) Launch Pod Container (LPC) and Self-Propelled Launcher Loader (SPLL) Performance: The launch pod container, rocket, and Self-Propelled Launcher Loader tests confirmed that the system was safe for operational testing. Single and ripple firings with a crew in the cab have been successfully demonstrated. The Self-Propelled Launcher Loader has performed well as a launch platform. 177 rockets have been fired from the launcher with no adverse effects on the vehicle. Launcher and carrier performance was good during the facility vehicle testing and the Mobility and Endurance Tests. Problems encountered were identified for corrective action and further testing during Maturation Phase. The launcher performed well in the simulated arctic, desert, and tropic environments with only minor problems noted at low temperature which were being corrected and retested during the Maturation Phase. No problems were encountered during the loading tests of the launcher and launch pod containers into the Cl41 aircraft. Test results indicate that the launch pod container can perform the three intended roles of transportation, storage, and launch pod. Rail transportation testing of the launch pod container and rocket is complete and no significant problems have been noted.
- 2 (U) Firing Cycle Results: Validation Phase contractors combined accumulated 9792 km in road tests and 3996 firing cycles on six launchers. Vought fired 127 rockets (60 scored). Testing of both the launcher and rockets included environmental conditioning and rocket firing at temperature extremes (+140° and -25°F) with rockets exposed to expected life cycle dynamic environments. Although sample size was limited, the results compare favorably with requirements for this stage of development tenting.
- 3 (U) Rocket Performance: The Vought rocket reliability includes results of 62 scored firing attempts. There were two prefire failures associated with open firing circuits. Of 60 rockets fired, there were three failures (one was removed after a validated design change), and there was one "no test" due to failed range tracking radar. All fuzes and warheads functioned properly.
- (b) (U) Maturation Phase: Maturation development tests were initiated with rocket flight tests in Nov 80 and launcher ground test in Jan 81. Six nonscored development flights were conducted during Nov 80-Jan 81 to refine the warhead dispersal system. Forty-three scored flights have been successfully conducted from the SPLL as of 1 Nov 81. Launcher ground tests, including transportability, countermeasures, electromagnetic radiation, nuclear, and environmental testing,

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have been conducted since Jan 81. These prequalification tests have progressed on schedule with hardware performing very well. Remaining Maturation Phase development, production qualification and follow-on operational schedules have been adjusted for the four-month delay in delivery of production carrier vehicles from FMC due to the strike at the manufacturer's plant.

- c. (U) Description of Equipment Being Tested.
- (1) (U) The MLRS is a surface-to-surface, free-flight rocket launcher system with the capability to launch up to 12 rockets in a ripple-fire mode. The MLRS is comprised of three major components: the Self-Propelled Launcher Loader (SPLL), the launch pod containers, and the rocket.
 - (2) (U) The SPLL consists of the carrier, the fire control system, and the launcher loader module.
 - (a) (U) The carrier is a tracked vehicle derived from the M2 Bradley Infantry Fighting Vehicle.
- (b) (U) The automated Fire Direction System (FDS) for the MLRS is based on the Battery Computer System but uses unique MLRS software. The FDS will communicate with the SPLL Fire Control System via secure radio link. The SPLL Fire Control System contains a microprocessor that is capable of computing firing mission data using information from the FDS or manually input by the crew.
 - (c) (U) The launcher loader module provides an armored housing for two launch pod containers.
- (3) (U) The launch pod container serves as a shipping and storage container, as well as a launch pod for six rockets. In a tactical environment the launch pod container will be discarded after the rockets are fired.
- (4) (U) The MLRS rocket is a spin-stabilized, free-flight rocket. The warhead fuze contains an electronic timer that is set by the Fire Control System just before launch. The fuze initiates the warhead airburst dispensing system over the target area to dispense 644 XM77 submunitions, dual-purpose antipersonnel/material submunitions.
- d. (U) Test Management: The MLRS Maturation Phase testing is being conducted under the Single Integrated Development Test Concept. Results obtained during testing are being evaluated by the Army Material Systems Analysis Activity (AMSAA)

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and the US Army Operational Test and Evaluation Agency (OTEA). The Project Management Office manages both US and international aspects of the test program through formally chartered Test Integration Working Groups (TIWG).

- e. (U) Reliability, Availability, and Mairtainability (RAM) Requirements: For all subsystems and components, the contractor is required to produce a design with reliability, availability, and maintainability (RAM) characteristics which are consistent with meeting performance effectiveness requirements at lowest possible life-cycle costs. An important result of the Validation Phase was the establishment of firm RAM system requirements which were converted to appropriate goals and threshold values.
- f. (U) Source of Hardware: Maturation Phase development tests will be conducted utilizing R&D manufactured hardware. Units tested during Production Qualification Testing and OT III will use hardware manufactured on the production line.
 - 2. (U) Operational Test and Evaluation:
- a. (U) Validation Phase. The MLRS Operational Test (OT) I was an integral part of a combined Development Test/Operational Test (DT/OT). The OT portion of the test lasted for six weeks, and the equipment was tested using active duty crews. Two firing sections, each manning an MLRS candidate system, conducted a series of firing and nonfiring operational exercises in a tactical environment. OT focus was directed toward man-machine interfaces and was conducted in three phases. Phase I was a three-week phase that was devoted to training and pilot testing at Fort Sill, OK. Phase II, also conducted at Fort Sill, consisted of two weeks of nonfiring field exercises in a simulated tactical environment. Phase III was a one-week combined Development Test/Operational Test live-fire exercise conducted at White Sanda Missile Range (WSMR), NM. During that phase, 12 rockets were fired from each of the candidate systems. The OT provided data to assess operational effectiveness, reliability, availability, and maintainability (RAM), operational survivability human factors, safety, training, doctrine, organization, tactics, and the adequacy of the proposed logistics concepts. All data and associated analyses were provided to the Army Systems Acquisition Review Council (ASARC) III and were used as a basis for a favorable DSARC decision to enter the Maturation Phase and concurrent low-rate production. Additional operational testing was recommended to assess battery mission performance. This testing will assess performance of production hardware including the Pire Direction System, on-board Position Determining System, Platoon Leader's Digital Message Device, 10-ton resupply vehicle (HEMAT), and trailer (HEMAT), RAM and BITE of production equipment, interoperability and the operational organizational concepts.

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- (1) (U) OT I Test results were evaluated by the Army Materiel Systems Analysis Agency and the Operational Test and Evaluation Agency (OTEA). OTEA conducted the operational testing.
- (2) (U) Test facilities used during operational testing included Fort Sill, OK, and White Sands Missile Range.
 Two Launcher Sections, a Fire Direction Center section, Maintenance Section, Ammunition Section, and Direct/General Support
 Maintenance section participated in the operational testing.
- (3) (U) Operational Test I was used as a basis for the demonstrated RAM characteristics presented to the DSARC III.
 - (4) (U) Operational Test I was completed prior to the low-rate production contract award.
- b. (U) Maturation Phase. In addition to the normal Operational Test (OT) III, HQ TRADOC, the combat developer, has elected to conduct a Force Development Test & Experimentation (FDTE) during Jun-Aug 1982. This testing will assist in finalizing MLRS operational concepts and procedures and assess the suitability of the system to enter into Operational Test III.
- (1) (U) Testing will be conducted to address the interoperability of command, control, and communications in a realistic environment with respect to:
 - (a) (U) MLRS Fire Direction System (FDS).
 - (b) (U) SP L Fire Control System.
 - (c) (U) Platoon Leader's Digital Message Device.
 - (d) (U) TACFIRE Tactical Fire Direction System.
 - (e) (U) FIREFINDER (Artillery Locating Radar AN/TPQ-37: Counterfire radar).

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(2) (U) Testing will also be conducted to address reliability, availability, meintainability, and supportability to include the impact of the built-in test equipment. Testing will also focus upon the TRADOC operational and organizational concept as it applies to a complete MLRS Battery.

System Characteristics:

Operational/Technical Characteristics	Goal	Maturation Thresholds	Validation Thresholds	Demonstrated Performance
System Accuracyl/ Maximum Range Reaction time - Prepare to Fire - Displace - Total Mission	:	ŝ		· -
Reliability, Availability, Maintainability				
° Reliability - rocket - SPLL	.9597 .8892	.90 .83	.83 .71	.93 .84

rogram Element: #6.43.14.A DOD Mission Area: #212 - Indirect F	Title: Multiple Launch Rocket System (MLRS) Budget Activity: #4 - Tactical Programs				
Operational/Technical Characteristics	Goal	Maturation Thresholds	Validation Thresholds	Demonstrated Performance	
* Availability					
- MLRS Operational Availability	TBD	TRD	N/A	$\frac{2}{2}$	
- Essential unscheduled maintenance actions per 1000 hours of launcher	50	70	N/A	<u>2</u> /	
loader module operation - Performance of Built-In Test Equipment. % of items	72	102	H/A	2/	
- removed with no evidence of failure					
* Maintainability					
- SPLL (MTTR) (hours)					
Organizational	1.0	1.10	n/a	2/	
Direct/General Support	4.0	4.40	N/A	2/	

NOTE: 1/ Goals and thresholds are established for 2/3 maximum range $\overline{2}/$ To be provided after assessment of Maturation Phase results.

FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.18.A

DOD Mission Area: #222 - Ground Based Antiair

and Tactical Missile Defense

Title: Division Air Defense (DIVAD) Gun Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1981 Actual 65203	FU 1982 Estimate 29949	FY 1983 Estimate 10918	FY 1984 Estimate	Additional to Completion	Total Estimated Cost 226722 4
D648	Division Air Defense	65203	29949	10918	0	0	226722

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides necessary development prototyping and evaluation effort to define and develop a new weapon to meet Army requirements for slow-altitude air defense in the forward maneuver area during the mid-1980 time period.

C. (U) BASIS FOR FY 1983 RDTE REQUEST: Funds will permit the completion of the development program to provide a radar-directed, medium caliber (40mm) self-propelled gun that will significantly improve the divisional short-range, low-altitude air defense capability in the 1980's. An Army Systems Acquisition Review Council (ASARC/DSARC) III to be held in March/April 1982 will consider the system for full-scale production. A contract for Initial Production Facilities, long-lead items, and concurrent final development efforts was awarded on 7 May 1981. Development to be completed includes producibility engineering and planning (PRP), Technology Transfer Fabrication and Test (TTF&T) of foreign guns and ammunition, Reliability, Availability, and Maintainability (RAM) growth, and Integrated Logistics Support (ILS). Major milestones are:

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Program Element: #6.43:18.A

DOD Mission Area: #222 - Ground Based Antiair and Tactical Missile Defense

Title: Division Air Defense (DIVAD) Gun
Budget Activity: 44 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
Initiate Development	Jan 1978	Jan 78
Complete Prototype Evaluation	Nov 1980	Nov 80
Initiate Production Contract Award	May 1981	May 81 .
Complete Engineering Devel- opment	May 1983	May 83
Activate First Gun Battslion (IOC)	Mar 1985	Mar 85

D. (U) COMPARISON WITH FY 1982 RDTE REQUEST: (\$ in thousands)

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1982	65203	29949	10918	0	226722
submission)	65203	30042	0	0	215800

- 1. (U) FY 1982 decrease of \$0.93 million is due to the application of current inflation indices.
- 2. (U) The FY83 increase of \$10.918 million is due to increases in funding to support the development of Integrated Logistics Support (ILS) items and expanded Reliability, Availability, and Maintainability (RAM) activities.
- E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands)

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Program Element: #6.43.18.A

DOD Mission Area: #222 - Ground Based Antisir and Tactical Missile Defense

Title: Division Air Defense (DIVAD) Gun Budget Activity: #4 - Tactical Programs

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional To Completion	Total Estimated Cost
Weapons and Tracked Combat						
Vehicles, Procurement, Army:	138000	376200	673900	747800	1435200	3371100
Funds (current requirements)						
Funds (as shown in FY 1982			•			
submission)	138000	372200	754800	745700	1407000	3417700
Quantities (current requirements)	0	50	96	130	342	618
Quantities (as shown in FY 1982						
submission)	0	50	96	130	342	618

Hardware production begins with 50 fire units in FY82, and an economic production rate will be realized in FY84. IOC is now currently scheduled for 2nd Quarter FY 1985.

	FY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	Fy 1984 Estimate	Additional To Completion	Total Estimated Cost
Ammunition Procurement, Army:						
Funds (current requirements)	0	68800	70900	127600	268500	535800
Funds (as shown in FY 1982 submission)	0	59000	59300	172300	546500	837100
Quantities (current requirements)	0	79000	239000	696000	2436000	3450000
Quantities (as shown in FY81 submission)	o	74000	393000	1440000	6467000	8374000

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DOD Mission Area: #222 - Ground Based Antiair and Tactical Missile Defense

Title: Division Air Defense (DIVAD) Gun Budget Activity: #4 - Tactical Programs

Ammunition facilitization was funded in 1982 along with sufficient rounds to support testing. The 1983 budget begins procurement of sufficient rounds to support fielding the system.

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Program Element: #6.43.18.A

DOD Mission Area: #222 - Ground Based Antiair
and Tactical Missile Defense

Title: Division Air Defense (DIVAD) Gun
Budget Activity: #4 - Tactical Programs

- F. DETAILED BACKGROUND AND DESCRIPTION: The Division Air Defense Gun development program (Project \$D648) is the culmination of several years of effort by the Army to define its short-range air defense requirements which established the need for a new air defense gun. This requirement was established in March 1977 with the approval of a Required Operational Capability (ROC) document for a new air defense gun in the medium caliber (30-40mm) range which could adequately meet the threat of the 1980's and beyond. This gun will give divisional maneuver forces a quick-reacting weapon system that can effectively engage pop-up targets such as helicopters armed with antitank guided missiles and high-speed, low-flying aircraft at distances of up to under The system will be mounted on a tank chassis to provide mobility and survivability compatible with maneuver forces. It will have a full-solution digital fire control system will have a rapid changeover to provide pround-support fires when required. The current Vulcan Air Defense System, with its 20mm armament, optical tracking, and open turret, is inadequate in terms of survivability, mobility, terminal effects, and effective range.
- G. (U) RELATED ACTIVITIES: Prior to FY 1979, work was performed under Program Element (PE) 6.33.01.A. The two contractors developed prototypes using mature components or modifications thereof developed by both foreign at i domestic concerns. This was in order to enhance interoperability with both our NATO allies and other US military servi es. Ford Aerospace and Communications Corporation (FACC) used the Bofors L70 40mm gun from Sweden and General Dynamics (GD) used the Oerlikon KDA 35mm gun from Switzerland. Both guns and associated ammunition are widely deployed in NATO. US-developed radars, computers, Identification Friend or Foe (IFF), and Field Maintenance Test Sets (FMTS) were also utilized. Ford Aerospace and Communications Corp (FACC) has modified the radar and computer developed for the F-16 fighter (Program Element 2.71.61.F), and General Dynamics (GD) has modified the fire control system developed for the Navy's Phalanx Air Defense System (Program Element 6.43.58.N). Both contractors have adapted IFF systems developed for other air defense programs and the M48A5 tank chassis. Close lisison is being maintained with each developing country and agency to prevent duplication of efforts. Where possible, test data from previous foreign, Air Force, Navy, or other developer tests of these components is being used in lieu of separate tests.
- H. (U) WORK PERFORMED BY: The program is managed by the Project Manager, DIVAD Gun, US Army Armament Research and Development Command, Dover, NJ. Contracts were swarded to Ford Aerospace and Communications Corporation (FACC), Aeronutronic Division, and General Dynamics (GD), Pomona Division, for the competitive development of a DIVAD Gun system. This phase of development culminated in May, 1981 with a production contract award to Ford Aerospace, the competition winner.

Program Element: #6.43.18.A

DOD Mission Area: #222 - Ground Based Antiair
and Tactical Missile Defense

Title: Division Air Defense (DIVAD) Gun
Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: The Gun Low Altitude Air Defense System (GLAADS) testbed was delivered to the Army in September 1975. The purpose of the testbed was to demonstrate through use of off-the-shelf hardware, the extent to which current technology could be used in the design of a modern gun air defense system. Testing was concluded in December 1975. The major conclusion of the test was that a second order digital fire control (i.e., the ability to more accurately predict intercept by including acceleration in the fire control solution) could be integrated with an air delense gum to provide a capability to effectively engage modern targets. A Cost and Operational Effectiveness Analysis (COEA) was initiated to determine the most cost-effective solution to our divisional air defense needs. In April 1977, the Secretary of Defense approved development of the DIVAD Gun subject to completion of a Cost and Operational Effectiveness Analysis (COEA) and a Defense Systems Acquisition Rev. Council (DSARC) review of proposal costs prior to contract sward. The Request for Proposal (RFP) was released in April 1977, and five contractors submitted proposals in July 1977. The CORA and evaluation of the proposals were completed in September 1977. Army Systems Acquisition Review Council (ASARC) II was held in October 1977, and DSARC II was held in November 1977. Announcement of the selected contractors, Ford Aerospace and Communications Corporation (FACC) and General Dynamics (GD), was made in November 1977. The Under Secretary of Defense approved the DSARC II recommendation on 6 January 1978. The Army signed the contracts with FACC and GD on 13 January 1978. Design freeze was accomplished in December 1978. Prototype fabrication continued through FY79 and the first three quarters of FY80 under the 29-month accelerated development program. The prototypes for Development/Operational Testing (DT/OT) were delivered to the Army in June 1980 as scheduled. The DT/OT was conducted from mid-June 1980 to mid-November 1980. The production phase Request for Proposals was released to the contractors in May 1980, and proposals were received in August 1980. Evaluation of proposal and test data began in August 1980 and continued through the third quarter of FY 1981. A contract sward was made on 7 May 1981 to procure Initial Production Facilities (IPF), produce long-lead items required to support the FY82 production, and concurrently continue development with emphasis on support and Integrated Logistics.
- 2. (U) FY 1982 Program: The development of the system continued throughout FY82. An Army Systems Acquisition Review Council/Defense Systems Acquisition Review Council (ASARC/DSARC III) scheduled for Mar/Apr 1982 will consider the system for production. A contract will be awarded in April 1982 to exercise the first production option for 50 fire units with spares, amuunition, and support equipment.
- 3. (U) FY 1983 Planned Program: The FY 1983 procurement will exercise the second production option for 96 fire units with spares, ammunition, and support equipment.

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Program Element: #6.43.18.A

DOD Mission Area: #222 - Ground Based Antiair and Tactical Missile Defense

Title: Division Air Defense (DIVAD) Gun
Budget Activity: \$4 - Tactical Programs

- 4. (U) FY 1984 Planned Program: The FY84 procurement will exercise the third option for 130 fire units with spares, ammunition, and support equipment.
- 5. (U) Program to Completion: This is a continuing procurement program. Delivery of gun systems, ammunition, and support equipment will continue through the exercise of an option for FY84. A follow-on production contract with options for the remaining 472 gun systems will be awarded during the second quarter of FY85. The first gun battery will be fielded in March 1985. Program completion is estimated for FY 1989.

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Program Element: #4.43.18.A

DOD Mission Area: #222 - Ground Based Antiair and Tactical

Missile Defense

Title: Division Air Defense (DIVAD) Gun-Budget Activity: 44 - Tactical Programs

J. (U) TEST AND EVALUATION DATA:

1. (U) General: The Division Air Defense (DIVAD) Gun Program is a competitive, "hands-off," accelerated acquisition effort designed to achieve Initial Operational Capability in the minimum possible time at an affordable cost. In keeping with this accelerated acquisition strategy, a 3-month Phase 1 combined development test/operational test (DT/OT) was planned to determine the system's effectiveness, suitability, and readiness for production. Extensive reliability, supportability, and climatic testing has been deferred until the next phase following selection of a single system contractor. The DT/OT was started on 13 June 1980. Because the prototype hardware was less mature than anticipated, it was necessary to extend the planned three-month DT/OT by two additional months. Teating was completed satisfactorily during the extended period. Using the Source Selection Process, Ford Aerospace and Communications Corporation (FACC) was selected as the winning contract on 7 May 1981.

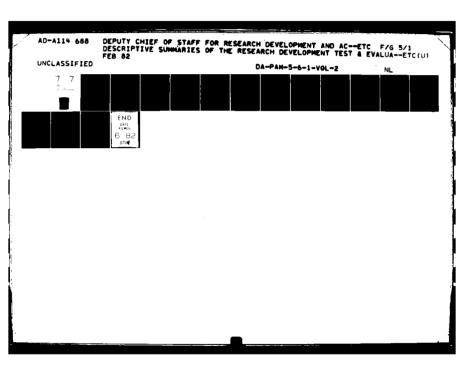
2. (U) Combined Development/Operational Test and Evaluation:

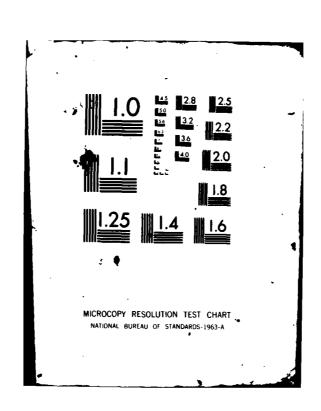
a. (U) The DIVAD Gun System is being evaluated by combined Development Test/Operational Tests (DT/OT), described below, from which both the Development and Operational Testers share the collected data and which are used to form an independent assessment of results. Separate Developmental/Operational Testing is not planned.

b. (U) Phase I Testing:

(1) (U) The Phase I DT/OT testing was conducted at North McGregor Range, Ft Bliss, TX, during the period 13 June 1980-14 November 1980. The Government testing was designed to obtain system performance data which was used as input for the analyses/evaluations which were conducted by the US Army Operational Test and Evaluation Agency (OTEA), the US Army Materiel Systems Analysis Activity (AMSAA), the US Army Office of Missile Electronic Warfare (OMEW), the US Army Armament Research and Development Command (ARRADCOM), and the Source Selection Evaluation Board (SSEB). Both firing and nonfiring tests in system maneuvering and system normaneuvering modes were conducted to obtain evaluational data for both competing contractors. The tests were conducted in an operational environment that was as realistic as possible considering constraints imposed by considerations and the instrumentation system. Both prototype systems from each contractor were instrumented to allow the collection of continuous and discrete data. During nonfiring tests, in order to conserve aircraft test resources and adequately simulate the operation of a DIVAD Gun section, each air threat (single and multiple formation of

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Missile Defense

Title: Division Air Defense (DIVAD) Gun Budget Activity: #4 - Tactical Programs

high-performance jet aircraft and helicopters) was presented to both deployed systems simultaneously. When live firing was conducted, only items from one contractor were tested at a time. Each pass consisted of single or multiple high-performance jet aircraft and helicopters, as well as representative ground targets. Reliability, availability, maintainability (RAM) data was collected from all fire units as it occured. Contractor personnel performed all maintenance (to exclude government-furnished equipment maintenance; e.g., chassis and radios) and supply functions above operator evel. Exact data (e.g., action taken, time required to perform corective action, sequence) was reported as required by the combined Development Test/Operational Test Plan. Specific maintenance and supply actions normally performed by the US Army Training and Doctrine Command (TRADOC) support troops were performed by the contractor. Typical military personnel operated the four prototypes throughout DT/OT. The Government also conducted testing of the proposed 35mm and 40mm ammunition to determine the lethality against threat aircraft. The testing expanded the government data base for point detonating fuzed and proximity-fuzed ammunition.

- (2) (U) Equipment tested during Phase I was limited to the prototypes delivered by the two development contractors. The majority of the Integrated Logistics Support effort was purposely delayed until Phase II. The support equipment and material (maintenance test sets, manuals, etc.) will be tested during Phase II prior to initial operational capability (IOC).
 - (3) (U) Major test programs scheduled and major review milestones:

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Hissile Defense

Title: Division Air Defense (DIVAD) Gun Budget Activity: 44 - Tactical Programs

Test and Evaluation Milestones

Contractor 60-Day Test Completed	May	80
Contractor 30-Day Demonstration Completed	Jun	80
Start of Combined	Jun	80
Development Test/Operational Test (DT/OT)		
Source Selection Evaluation Board		
(SSEB) Convenes	Aug	80
Completion of DT/OT	Nov	80
Source Selection Decision and Phase II	May	81
Contract Award		
Army Systems Acquisition Review Council		
(ASARC) (Part of Phase II)	Mar	82
Defense Systems Acquisition Review		
Council (DSARC) (Part of Phase II)	Apr	82

(4) (U) The DT/OT was the first test of an integrated DIVAD Gun System. Extensive data from European tests of the ordnance subsystems and other service tests of the fire control/radar subsystems as available and was used when appropriate. The competitive "hands-off" acquisition strategy precluded testing of different configurations during DT/OT. The systems tested during DT/OT were nearly production-ready prototypes which will require only minor modification prior to production.

c. (U) Phase II Testing:

- (1) (U) Government Maturity Tests (GMT): Government Maturity Tests (GMT) will be conducted by the government commencing in November 1981. These tests will consists of a Check Test, Durability/Mobility Test, and Climatic Field Test (cold climate).
- (a) (U) Check Test: The government will perform a check test and evaluation on one of the two prototypes used during DT/OT to assure that all deficiencies and shortcomings which were noted during DT/OT have been corrected. Additional

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Title: <u>Division Air Defense (DIVAD) Gun</u>
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objectives of the Check Test will be to demonstrate Built-In Test Equipment (BITE) capability not performed during DT/OT and to increase the RAM data base generated in DT/OT.

- (b) (U) Durability/Mobility Test: This test will be designed to assess the DIVAD Gun System in a stressful environment and will provide the baseline for reliability growth.
- (c) (U) Climatic Field Test: This test will be designed to assess the DIVAD Gun System performance in a natural cold weather environment. The test will include mobility testing and limited firing tests.
- (2) (U) Follow-On Evaluation Testing (FOET): This group of tests will be conducted by the government in conjunction with the logistics deliverable schedule of the contract. The objective of FOET testing is to evaluate the logistics/training support package delivered by the contractor. These tests will consist of Physical Teardown and Evaluation (PT&E), DS/GS Training, Operator/Organizational Training, Consolidated Logistics/Training Support Testing, and Follow-On EM Testing (FOEM).
- (a) (U) PT&E: This test will be conducted to review operator through GS maintenance manuals; DIVAD Gun subsystem/component/parts accessibility; and adequacy of Month after Contract (MAC) procedures, tools, and equipment.
- (b) (U) DS/GS Training: This test will be conducted to evaluate individual and contact team maintenance training at DS/GS levels, to include the use of maintenance trainers.
- (c) (U) Operator/Organizational Training: This test will be conducted to evaluate individual operator and collective (crew) training, to include manuals and the use of Proficiency and Classroom Trainers.
- (d) (U) Consolidated Logistics/Training Support Testing: This test will be conducted in conjunction with the ARTEP. Areas which will be evaluated include, but are not limited to: Squad- through battery-size training the part defense taction, system maintainability, operator through GS level maintenance and supply procedures, logical port equipment, etc.
 - (e) (U) FORM Testing: This test will be conducted to complete EM testing of the DIVAD Gun System.

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Title: Division Air Defense (DIVAD) Gun Budget Activity: 44 - Tactical Programs

- (3) (U) Initial Production Tests (IPT): The IPT will be conducted at three separate locations with three production DIVAD Gun Launch Systems. The three production systems will be randomly selected by the government and shall be delivered by the contractor to the government as follows: One to APG, MD; one to Ft Bliss, TX; and one to Ft Bluachuca, AZ. IPT will be designed to demonstrate that the DIVAD Gun conforms to system specifications, as well as stated quality, performance, safety, operational effectiveness, human factors, and reliability and maintainability standards.
- (4) (U) Comparison Tests (CPT): CPT will be conducted to evaluate correction of test-disclosed deficiencies/shortcomings, to detect quality deficiencies and to assess RAM.
- (a) (U) CPT I: This test will be conducted on two production systems as selected by the government. The test will include as a minimum 1,000 fire control hours and 20,000 rounds fired on one system.
- (b) (U) CPT II: This test (if required) will be accomplished within a 6-month period and include a total number of fire control hours and rounds as deemed appropriate by the government. However, the total number of rounds and fire control hours required for CPT II will not exceed that required for CPT I.

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Title: Division Air Defense (DIVAD) Gun
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(5) (U) Phase II Test Schedule/Locations:

Test	Schedule (MAC)*	Location
CHT		
Check Test	7-8	Ft Bliss, TX
Durability/Mobility Test	9-13	APG, MD
Climatic Field Test	20-22	CRTC, AK
FOET		
PTSE	31-34	ANAD, AL
DS/GS Training	32-41	USAMMCS, AL
Operator/Organizational Training	36-41	Pt Bliss, TX
Consolidated Logistics/Training Support	42-46	Pt Bliss, TX
POEM	42-44	WSMR, NM
IPT		
	36-41	APG, MD
	36-41	Ft Bliss, TX
	36-41	EPG, AZ
CPT I	47-52	APG, MD
CPT II	TBD	APG, MD

*MAC - Months After Contract

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Missile Defense

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d. (U) Reliability, Availability, Maintainability (RAM):

- (1) (U) Reliability, availability, and maintainability (RAM) objectives were included as cost/performance trade-offs in the development contracts. The RAM criteria were established by the Defense Systems Acquisition Review Council at values which, if not achieved by completion of Phase I testing, would require detailed justification in terms of the cost/performance trade-offs which were made and the contractor's reliability growth curves (projected and demonstrated) before proceeding into production. A reliability growth program will be included in the Phase II effort to ensure achievement of the Required Operational Capability objective.
- (b) Data provided under the RAM portion of the Phase II contract will be utilized, together with data generated during Phase I tests, to give a statistical base from which to assess RAM parameters. Data from any other valid source including laboratory tests, bench tests, contractor range tests, and contractor demonstrations will be considered when appropriate. An independent RAM assessment of the system under operational conditions will also be made based upon the Operational Testing.

Operational/Technical Characteristics	Objectives	Performance
Acquisition Radar	-Capable of detecting fixed wing aircraft at and helicopters at	-Yes (Phase I DT/OT)
Track Reder	-Capable of tracking aircraft to at least	•
Optical System	-Backup to reders (equivalent eccuracy).	
Cannon	-35 or 40mm	40mm - FACC selected as winning contractor by SSA on 7 May 81.
Identification of Friend or Foe (IFF)	-MARK XII, Mode 4 compatible. Verification in Phase II.	Partial testing in Phase I.

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DOD Mission Area: #222 - Ground Based Antiair and Tactical

Missile Defense

Title: Division Air Defense (DIVAD) Gun Budget Activity: 44 - Tactical Programs

Operational/Technical Characteristics	Objectives	Demonstrated Performance
Chaesis Dual Power Source	Modified M48A5 (XM988) Primary power unit and vehicle driven generator	Yes (Phase I DT/OT)
Reaction Time	Not greater than from target unmask	Yes (In Phase II)
Ammunition	Point Detonating High Explosive (PD) air defense round with self-destruct capa- bility; training/practice round; proximity (PROX) air defense round with self-destruct.	Yes (Phase I DT/OT)
Communications	Standard vehicle radios and intercom	•
Crew Size	Minimum of 3 men.	•
Environment	No hazardous environmental stresses.	ч
Transportability Range	C-5A-transportable	•
Probability of Hit	-Nommaneuvering target:	" (AMSAA simulation provided part of the data)
Probability of Kill (Given Hit)	-K-Kill; Frontal -A-kill; Frontal	" (BRL data included)

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DOD Mission Area: #222 - Ground Based Antiair and Tactical

Hissile Defense

Title: Division Air Defense (DIVAD) Gun Budget Activity: M - Tactical Programs

Operational/Technical Characteristics

Objectives.

Performance

Pire Control

Digital Computer

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FY 1983 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.21.A Title: Joint Tactical Fusion Program

DOD Mission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

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

Project Number	Title	PY 1981 Actual	FY 1982 Estimate	FY 1983 Estimate	FY 1984 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	12259	30417			To Be Determined (TB)	TBD
D926	All Source Analysis System (ASAS)	12259	30417			TBD	TBD

- BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The past decade has witnessed major technical advances and the introduction of increasingly sophisticated intelligence-gathering and weapons systems into the strategic and tactical operations of military forces-both friendly and opposing. Commanders at all echelons must have an intelligence system which will provide early detection, identification, correlation, and location of these enemy critical nodes in order to employ our own forces and weapons for effective enemy sttrition. The objective of this program is to develop and field an All-Source Analysis System (ASAS) which will provide the tactical commander with a highly automated capability at Division, Corps, and Echelons above Corps to analyze, correlate, fuse and report intelligence data from numerous tactical and strategic sensor systems; provide target nominations; and manage and control organic intelligence/electronic warfare assets.
- C. (U) BASIS FOR FY 1983 RDTE REQUEST: The FY83 request supports the development of the All-Source Analy is System under the Joint Tactical Fusion Program. Funds will be applied to the award of a Full-Scale Development (FSD) contract for ASAS RDTE systems, the continued development of a tactical simulation capability, the definition and engineering of sensor and command and control interfaces, the maintenance of the Army's Joint Tactical Fusion Test Bed (JTFTB) and support of the Joint Tactical Fusion Program Management Office (JTFPMO).

Program Element: #6.43.21.A Title: Joint Tactical Fusion Program

DOD Hission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1982 Submission
		None shown since program was being structured per Congressional guidance
Contract Award	20 FY 1983	
Phase 1 FSD Complete	10 FY 1985	
Porce Development Test &	•	
Evaluation (FDTE) Complete	30 FY 1985	
Phase 2 FSD Complete	20 FY 1986	
DT/OT Complete	4Q FY 1986	
ASARC III	30 FY 1987	
Production	4Q FY 1987	

COMPARISON WITH FY 1982 RDTE REQUEST. (\$ in thousands) D.

	FY 1981	FY 1982	FY 1983	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	12259	30417		To be determined (TBD)	TBD
Funds (as shown in FY 1962 submission)	10260	53547	•		

^{*} In FY 1981 and prior, these funds were included in FE 6.47.45.A., (Tactical Electronic Support Measures Systems), under project D926 (Tactical ENI Command and Control Systems).

FT 1981: \$1999 was reprogramed into this project as a result of initiation of the Joint Tactical Fusion Program and costs incident thereto.

Program Element: #6.43.21.A Title: Joint Tactical Fusion Program

DOD Mission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

FY 1982 and FY 1983: The funding level difference is attributable to program milestone adjustments in fu 1-scale development contract award date to FY 1983.

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

Program Element: #6.43.21.A Title: Joint Tactical Fusion Program

DOD Mission Ares: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

F. DETAILED BACKGROUND AND DESCRIPTION: The employment of highly mobile and technologically advanced weapon systems by opposing tactical military forces requires early detection, identification, and location. To support this requirement, sophisticated intelligence sensor systems which can detect and locate basic elements (such as electronic emitters) are being increasingly employed. There is a critical need to rapidly exploit this time-sensitive, high-volume sensor information and to effectively control and manage organic sensor and electronic warfare assets. The purpose of this program is to develop and field for the Army an All-Source Analysis System (ASAS) which will correlate and aggregate the large number of elements detected by various sensor systems; reduce them to force structures

; produce ground battle situation displays; provide target nomination and intelligence support; and manage and control organic sensor/electronic warfare assets. OSD submitted to Congress in December 1980 a joint Service/Agency-generated Joint Tactical Fusion Development and Acquisition Program Plan which combined the Battlefield Exploitation and Target Acquisition (BETA) project, the Air Force Enemy Situation Correlation Element (ENSCE) formerly ATFD, the Army All-Source Analysis System (ASAS)/TCAC-D Programs, and associated simulation projects into a Joint Fusion Program with the Army as the lead Service. The ASAS/ENSCE Programs make maximum use of the investments in BETA, the ASAS, Advanced Development Hodel SIGNALS Intelligence Electronic Warfare Subsystem (ADMSEMS), and Technical Control and Analysis Center (TCAC) Projects. The acquisition strategy is based on an evolutionary approach. It takes an existing functional baseline, develops compatible hardware for the tactical environment, and provides for the incremental development of software that reflects User needs and experience. The software architecture proceeds from existing baseline operating and data base management systems to the incremental development of an expanded operating environment that handles the ASAS/ENSCE requirements. For the hardware, development reflects a baseline tactical hardware set appropriately specified in terms of equipment and functions, which accommodates the software being developed and evolves to encompass technical and operational product improvements. This evolutionary approach to development is consistent with DOD Directives 5000.1 and 5000.2 and DOD initiatives to reduce the costs of acquisition programs.

- G. (U) <u>RELATED ACTIVITIES</u>: The following current related services/agencies program elements (PE) apply: 6.43.21.F, (Joint Tactical Fusion Program); 6.37.45A (Tactical ESM Systems), Project D925 (All Source Analysis System) and 3.58.85G, (Tactical Cryptologic Program). The Joint Program Office is an integrated entity which requires full Army and Air Force support to execute the acquisition strategy. It should be noted that the Air Force has only programed funds in their FY 1983 budget submission with none in subsequent years.
- H. (U) WORK PERFORMED BY: Current contractors are: Analytics, McLean, VA, and the Mitre Corporation, Bedford, MA. In-house development and contract monitoring are conducted by US Army Materiel Development and Readiness Command (DARCOM), Alexandria, VA; and the Joint Tactical Fusion Program Management Office.

Program Element: #6.43.21.A Title: Joint Tactical Fusion Program

DOD Mission Area: #344 - Tactical Commend and Control Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1981 and Prior Accomplishments: This project was funded under Program Element 6.47.45A (Tactical ESM Systems), Project #926 (Tactical EWI Command and Control Systems). A joint Service and Defense Advanced Research Projects Agency (DARPA) Project, Battlefield Exploitation and Target Acquisition (BETA), was initiated in 1977 to develop and demonstrate the feasibility of automated correlation and display of sensor-derived information to support near-realtime target nomination and battle management at Army Corps, Division, and in the Air Force Tactical Air Control Center. The BETA Joint Program Office was established and a program plan implemented to develop appropriate hardware and software to demonstrate this capability by end 1980 with follow-on support to fielding of service systems. Army and Air Force correlation centers (designated BETA Test Beds) with associated communications and interfaces were fabricated and plans were proceeding toward a European evaluation. However, the Test Beds could not successfully pass a systems integration test within the time constraints and were not deployed. Congress redirected BETA toward development of joint tactical fusion systems for the Army and Air Force. Following correction of deficiences and a demonstration and acceptance at the contractor plant in February 1981, the Test Beds were deployed to Fort Hood, Texas, and Hurlburt Field, Florids, where they are undergoing User evaluation.
- 2. (U) FY 1982 Program: The Joint Tactical Fusion Program was established in January 1981 and directed toward the joint Service development and acquisition of ASAS and ENSCE. Effort is focused on the preparation of the Statement of Work and system specification to be incorporated in the Request for Proposal (RFP) for the competitive full-scale development. The Joint Fusion (formerly BETA) Test Beds are undergoing User evaluation that will be factored into the RFP. The tactical simulation development is on track to support the ASAS development, the Test Beds, and operational exercises. Communications and system interfaces are being defined. Effort is also underway to prepare for a possible activation of a limited fusion operational capability in the European theater.
- 3. (U) FY 1983 Planned Program: A source selection process will commence in FY83 and culminate in contract award for full-scale development by 2QFY83. All necessary experimental work will have been performed, User assessments provided, User requirements prioritized, and the proposed system ready for full-scale development. Work will continue on the definition of the communications, sensor and command and control interfaces. Management for the implementation of sensor and command and control interfaces will vary with changes to existing systems being managed by the JTFPMO and coordinated by the JTFPMO for systems under development. Work on tactical simulation to support development, training, and operational exercises will also continue. The Test Beds will be utilized for User evaluation, participation exercises, and as a development tool for the evaluation of the evolving versions of software. Funds will also be expended for JTFPMO support and for Federal Contract Research Center (FCRC) and Systems Engineering and Technical Analysis (SETA) contractor support including a software verification and validation effort.

tware verification and validation effort.
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Program Element: #6.43.21.A Title: Joint Tactical Fusion Program

DOD Mission Area: #344 - Tactical Command and Control Budget Activity: #4 - Tactical Programs

- 4. (U) FY 1984 Planned Program: Development will continue with a critical design review of the hardware and a preliminary design review of software leading to a physical contiguration sudit and the integration of hardware and software prior to Force Development Test and Evaluation (FDT&E) slated for early FY85. During FY84 up to two versions of software which add incremental capabilities will be released, and the hardware, except for deficiency correction, will have been essentially completed. Work will continue on sensor and communications and command and control interfaces and on tactical simulation.
- 5. (U) Program to Completion: The emphasis in FY85 and beyond will be on software development and enhancements, continued testing and User assessments of evolving software, and a production decision by 3QFY87.

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