DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/6 5/1 DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT TEST & EVALUA--ETC(U) AD-A101 306 JAN 81 UNCLASSIFIED NL T № 6

13 221

VOLUME II

Supporting Data FY 1982 **Budget Estimate**

Submitted to CONGRESS January 1981 (AMENDED 30 MAR 81)

Descriptive Summaries Of The



RESEARCH DEVELOPMENT TEST & EVALUATION Army Appropriation FY 1982(U)

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

for public to the coll sale; its distribution is unlimited.

AD A 101306

VOLUME II

DESCRIPTIVE SUMMARIES FOR PROGRAM ELEMENTS

OF THE

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY PROGRAM

FY 1982 (U)

JANUARY 1981

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

A

FOREWORD

These volumes have been prepared to provide information on the US Army Research, Development, Test and Evaluation Program for Congressional Committees during the Fiscal Year 1982 hearings. This information is in addition to the testimony given by US Army witnesses.

These volumes contain a descriptive summary for each program element to be financed during FY 1982. Descriptive Summaries for projects within the program elements to be financed during FY 1982 for \$5.0 million or more appear inmediately following the applicable program element. Where there are several items under development within a project, a separate summary has been provided for each item that exceeds \$5.0 million during FY 1982. A Test and Evaluation Section is provided for all major weapon systems. Major weapon systems are identified by an asterisk in the Table of Contents.

The formats and contents of these volumes are in accordance with guidelines and requirements of the Congressional Committees insofar as possible. Information previously provided in the <u>SAC Data Book</u> is consolidated into these volumes. The <u>SAC Data Book</u> information appears at the beginning of each program element descriptive summary.

A direct comparison of FY 1980, FY 1981, FY 1982, and FY 1983 data in this Program Element Listing with data shown in the Program Element Listing dated January 1980 will reveal significant differences. Many of the differences are attributable to the following factors:

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

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

UNCLASSIFIED

TABLE OF CONTENTS

BUDGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME I

TECHNOLOGY BASE	
.11.01.A	IN-HOUSE LABORATORY INDEPENDENT RESEARCH (ILIR)
.11.02.A	DEFENSE RESEARCH SCIENCES
AH43	RESEARCH IN BALLISTICS
AH45	AIR MOBILITY RESEARCH
B1157	RESEARCH IN SCIENTIFIC PROBLEMS WITH MILITARY APPLICATIONS
/ BH57-03	ELECTRONICS
BH57-04	MATERIALS
BH57-05	MATHEMATICS
Bi157-06	MECHANICS AND AERONAUTICS
BH57-07	PHYSICS
81157-08	CHEMISTRY
AH60	RESEARCH IN LARGE CALIBER ARMAMENTS , ,
BS10	RESEARCH ON MILITARY DISEASES, INJURY AND HEALTH HAZARDS
BS10-A0	MILITARY DISEASE HAZARDS RESEARCH
ا≲اد_µs10-co	SYSTEMS HEALTH HAZARD RESEARCH
A31B	NIGHT VISION AND ELECTRO-OPTICS RESEARCH
5.21.05.A	MATERIALS
6.21.11.A	ATMOSPHERIC INVESTIGATIONS
6.21.20.A	NUCLEAR WEAPONS EFFECTS, NEAR MILLIMETER WAVE, FLUIDICS
6.22.01.A	AIRCRAFT WEAPONS TECHNOLOGY
6.22.02.A	AIRCRAFT AVIONICS TECHNOLOGY.
6.22.09.A	AERONAUTICAL TECHNOLOGY
5.22.10.A	AIRDROP TECHNOLOGY
6.23.03.A	MISSILE TECHNOLOGY.
6.23.07.A	LASER WEAPONS TECHNOLOGY

1 Amended 3 New Teen Area (E) and Project (ATEA)

UNCLASSIFIED

ii

BUDGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME I

	TECHNOLOGY BASE	(Continued)	PAGE NO.
	6.26.01.A	TANK AND AUTOMOTIVE TECHNOLOGY	1-143
1	6.26.03.A	LARGE CALIBER AND NUCLEAR TECHNOLOGY	1-148
J.	6.26.17.A	SMALL CALIBER AND FIRE CONTROL TECHNOLOGY	I-154
Ų	6.26.18.A	BALLISTICS TECHNOLOGY	1-160
И	6.26.22.A	CHEMICAL MUNITIONS AND CHEMICAL COMBAT SUPPORT	1-165
	6.27.01.A	COMMUNICATION/TECHNOLOGY	I-170
Ų	6.27.03.A	COMBAT SURVEILLANCE, TARGET ACQUISITION AND IDENTIFICATION	1-178
	6.27.04.A	MILITARY ENVIRONMENTAL CRITERIA DEVELOPMENT	I-183
1	6.27.05.A	ELECTRONICS AND ELECTRON DEVICES	I-188
Ú	6.27.06.A	CHEMICAL BIOLOGICAL DEFENSE AND GENERAL INVESTIGATION	1-199
	6.27.07.A	MAPPING AND CEODESY	1-204
7	6.27.09.A	NIGHT VISION INVESTIGATIONS	1-208
1	6.27.15.A	TACTICAL ELECTRONIC WARFARE TECHNOLOGY	1-213
	A042	TACTICAL ELECTRONIC WARFARE TECHNIQUES	1-219
	6.27.16.A	HUMAN FACTORS ENGINEERING IN SYSTEMS DEVELOPMENT	1-224
	6.27.17.A	HUMAN PERFORMANCE EFFECTIVENESS AND SIMULATION.	1-228
Ú	6.27.19.A	MOBILITY AND WEAPONS EFFECTS TECHNOLOGY	1-233
4	6.27.20.A	ENVIRONMENTAL QUALITY TECHNOLOGY	1-238
7	6.27.22.A	MANPOWER PERSONNEL AND TRAINING	1-243
1	6.27.23.A	CLOTHING, EQUIPMENT, AND SHELTER TECHNOLOGY	1-248
- 4	V AII98	CLOTHING AND EQUIPMENT TECHNOLOGY	1-255
Ų	6.27.24.A	JOINT SERVICES FOOD SYSTEM TECHNOLOGY	1-259
	6.27.25.A	COMPUTER AND INFORMATION SCIENCES	1-265
	6.27.27.A	NON-SYSTEMS TRAINING DEVICES (NSTD) TECHNOLOGY	1-271
1	6.27.30.A	COLD REGIONS ENGINEERING TECHNOLOGY	1-277
ı	6.27.31.A	MILITARY FACILITIES ENGINEERING TECHNOLOGY.	I-282
	6.27.32.A	REMOTELY PILOTED VEHICLES (RPV) SUPPORTING TECHNOLOGY	1-287

U Amended

UNCLASSIFIED

iii

BUDGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME I

6.27.33.A	HOBILITY EQUIPMENT TECHNOLOGY
. 27.34.A	MEDICAL DEFENSE AGAINST CHEMICAL AGENTS
. 27.46.A	TACTICAL AUTOMATIC DATA PROCESSING (ADP) TECHNOLOGY
5.27.70.A	HILITARY DISEASE HAZARDS TECHNOLOGY
A871	PREVENTION OF MILITARY DISEASE HAZARDS
A871-01	PREVENTION OF DISEASE AFFECTING TROOP OPERATION AND MOBILIZATION.
A871-02	PREVENTION OF BIOLOGICAL WARFARE DISEASES
6.27.72.A	COMBAT CASUALTY TREATMENT TECHNOLOGY.
6.27.75.A	COMBAT MAXILLOFACIAL INJURY
6.27.77.A	SYSTEMS HEALTH HAZARD PREVENTION TECHNOLOGY
A878	HEALTH HAZARDS OF MILITARY MATERIEL
A878-878C	TOXIC HAZARDS OF MILITARY ENVIRONMENTS
A879	MEDICAL FACTORS LIMITING SOLDIER EFFECTIVENESS
6.27.81.A	ENERGY TECHNOLOGY APPLIED TO MILITARY FACILITIES
ADVANCED TECHNO	LOCY DEVELOPMENT
5.31.02.A.	MATERIALS SCALE-UP
6.31.04.A	FUELS AND LUBRICANTS ADVANCED DEVELOPMENT
6.32.01.A	AIRCRAFT POWER PLANTS AND PROPULSION
6.32.06.A	AIRCRAPT WEAPONS
DO43	AIRCRAFT WEAPONS FIRE CONTROL
6.32.07.A	AIRCRAFT AVIONICS EQUIPMENT
6.32.09.A	AIR MOBILITY SUPPORT
6.32.11.A	ROTARY WING CONTROLS, ROTORS, AND STRUCTURES
DB41	ADVANCED STRUCTURES
D315	ADVANCED FLIGHT CONTROLS

UNCLASSIFIED

BUDGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

, ag

VOLUME I

6, 32, 16. A	SYNTHETIC FLIGHT SIMULATORS
/ DB34	ROTORCRAFT SYSTEMS INTEGRATION SIMULATOR (RSIS)
6.32,18.A	AIRDROP EQUIPMENT AND TECHNIQUES
5.32.21.A	NAP-OF-THE-EARTH AVIONICS AND NAVIGATION EQUIPMENT
.33.06.4	TERMINALLY GUIDED PROJECTILES
D236	TERMINAL GUIDANCE SYSTEMS
5.33.13.A	MISSILE/ROCKET COMPONENTS
.36.02.A	ADVANCED LAND MOBILITY SYSTEM CONCEPTS
. 36.06.A	LANDNINE WARFARE/BARRIER DEVELOPMENT
. 36,21.A	COMBAT VEHICLE PROPULSION SYSTEMS
DCO/	COMBAT VEHICLE ENGINES
. 36.31.A	COMBAT VEHICLE TURRET AND CHASSIS
. 37.02.A	ELECTRIC POWER SOURCES
.37.10.A	NIGHT VISION ADVANCED DEVELOPMENT
DK70	NIGHT VISION ADVANCED DEVELOPMENT
DKB7	NIGHT VISION COMBAT VEHICLES
. 37 . 25 . A	REMOTELY PILOTED VEHICLE (RPV'S)/DRONES
. 37. 31 . A	MANPOWER AND PERSONNEL
5.37.32.A	COMBAT MEDICAL MATERIEL
. 37. 34. A	COMBAT ENGINEERING SYSTEMS
. 37 . 39 . A	HUMAN FACTORS IN TRAINING AND OPERATIONAL EFFECTIVENESS
. 37.42.A	ADVANCED ELECTRON DEVICES
5.37.43.A	EDUCATION AND TRAINING
.37.44.A	TRAINING SIMULATION
.37.47.A	SOLDIER SUPPORT/SURVIVABILITY
. 37. 48. A	ADVANCED DEVELOPMENT OF AUTOMATIC TEST EQUIPMENT AND SYSTEMS
AJ29	AUTOMATIC TEST SUPPORT SYSTEMS (ATSS)

11 Amended 21 Hew Project Added

UNCLASSIFIED

BUDGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME I

	ADVANCED TECHNOLOG	Y DEVELOPMENT (Continued)	PAGE NO
L	6.37.49.A	TECHNICAL VULNERABILITY REDUCTION	1-514
	6.37.50.A	DRUG AND VACCINE DEVELOPMENT.	1-519
	6.37.51.A	MEDICAL DEPENSE AGAINST CHEMICAL WARFARE	1-523
H	6.37.52.A	DEMILITARIZATION CONCEPTS	1-527
		VOLUME II 1	
	STRATEGIC PROGRAMS		
ı	6.33.04.A	BALLISTIC MISSILE DEFENSE ADVANCED TECHNOLOGY	11-1
	6.33,08.A	BALLISTIC MISSILE DEFENSE SYSTEMS TECHNOLOGY PROGRAM.	11-6
	TACTICAL PROGRAMS		
	6.32.15.A	JOINT SURVIVABILITY INVESTIGATIONS	11-11
	6.33.03.A	MULTIPLE LAUNCH ROCKET SYSTEM (MLRS) TERMINAL GUIDANCE WARHEAD (TCW) FORMERLY	
		SURFACE-TO-SURFACE MISSILE ROCKET SYSTEM	11-15
zL.	_6.33.07.A 6.33.20.A	SHORT-RANGE AIR DEFENSE SELF-PROTECT WEAPON	11-21
IJ	6.33,20.A	CORPS SUPPORT WEAPON SYSTEM (FORMERLY ASSAULT BREAKER)	11-22
	6.35.36.A	ARMY STANDOFF JAMMER SUPPRESSION	11-27
	6,36,04.A	NUCLEAR MUNITIONS AND RADIACS	11-30
	6,36.07.A	JOINT SERVICE SMALL ARMS PROGRAM (JSSAP)	11-37
4	6.36.12.A	INFANTRY MANPORTABLE ANTIARMOR/ASSAULT WEAPON SYSTEM (IMAAWS)	11-42
	6.36.15.A	LETIAL CHEMICAL MUNITIONS CONCEPTS	11-46
	6.36.19.A	LANDMINE/BARRIER SYSTEMS	11-51
	6.36.27.A	COMBAT SUPPORT MUNITIONS	11-55
ı	Amended	HNOLARCICIED	
,	. 0.	UNCLASSIFIED	

vi

BUDGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME II

5.36.28.A	FIELD ARTILLERY AMMUNITION DEVELOPMENT	11
D007	FIELD ARTILLERY AMMUNITION AND FUZES.	1
D276	SENSE AND DESTROY ARMOR (SADARM)	11
. 36 . 29 . A	FIELD ARTILLERY CANNON SYSTEMS	11
.36.32.A	ARMORED COMBAT SUPPORT VEHICLE FAMILY	11
.36.35.A	ADVANCED MULTI-PURPOSE ARMAHENT SYSTEM.	11
37.05.A	PHYSICAL SECURITY	11
37.06.A	IDENTIFICATION FRIEND-OR-FOE (1FF) DEVELOPMENTS	11
D297	IDENTIFICATION FRIEND OR FOE NATO	11
. 37.07.A	COMMUNICATIONS DEVELOPMENT.	Ü
.37.11.A	AIRCRAFT ELECTRONIC WARFARE (EW) SELF-PROTECTION EQUIPMENT	11
DB52	SCOUT ATTACK HELICOPTER SURVIVABILITY FOUIPHENT	ii
37.13.A	JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEMS (JTIDS)	11
37.21.A	CHEMICAL DEFENSE MATERIEL CONCEPTS	- 11
DESI	CHEMICAL DECONTAMINATION MATERIEL	- 11
D.130	COLLECTIVE PROTECTION MATERIEL ARMORED VEHICLES	11
D601	CHEMICAL DETECTION AND WARNING MATERIEL	11
.37.23.A	COMMAND AND CONTROL	11
D186	HILITARY COMPUTER FAMILY (MCF)	11
. 37. 26. A	COMBAT SUPPORT EQUIPMENT.	11
. 37 . 30 . A	TACTICAL SURVEILLANCE SYSTEM.	11
. 37 . 37 . A	ANTIRADIATION MISSILE COUNTERHEASURES (ARM-CH)	11
.37.40.A	DIVISION AIR DEFENSE COMMAND AND CONTROL (SHORAD-C2 SYSTEM)	11
37.45.A	TACTICAL ELECTRONIC SUPPORT MEASURES SYSTEMS.	11
0907	TACTICAL ELECTRONIC SURVEILLANCE SYSTEM	11
D925	TACTICAL ELECTRONIC WARFARE INTELLIGENCE COMMAND AND CONTROL SYSTEMS.	11
.37.46.A *	SINGLE CHANNEL GROUND AND AIRBORNE RADIO SYSTEM (SINGGARS).	11

1 Amended

UNCLASSIFIED

vii

BUDGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME 11

6,37,55.A		TACTICAL ELECTRONIC COUNTERMEASURES SYSTEMS
DK12		COMMUNICATIONS ELECTRONIC COUNTERMEASURES SYSTEMS
DK14		EXPENDABLE JAMMERS
6.42.02.A		AIRCRAFT WEAPONS.
6.42.04.A		AIR MOBILITY SUPPORT EQUIPMENT
6.42.06.A		BLACKHAWK
6.42.07.A	*	ADVANCED ATTACK HELICOPTER
6.42.12.A		COBRA/TOW
6.42.15.A		III-1 MODERNIZATION.
6.42.17.A		SYNTHETIC FLICHT TRAINING SYSTEMS
6.42.18.A		AIRDROP EQUIPMENT DEVELOPMENT
6.42.20.A		ARMY HELICOPTER IMPROVEMENT PROGRAM
6.42.21.A		AN/UPD-7 SURVEILLANCE SYSTEMS
6.43.06.A	*	STINGER
6.43.07.A		PATRIOT (SAM-D)
D212 *		PATRIOT (SAM-D)
D213		PATRIOT ELECTRONIC COUNTER-COUNTERMEASURE (ECCM) ENHANCEMENT
6.43.09.A		ROLAND.
6.43.10.A	*	HELIBORNE MISSILE - HELLFIRE
6.43.11.A	*	PERSHING II
6.43.13.A		GRASS BLADE
6.43.14.A	*	MULTIPLE LAUNCH ROCKET SYSTEM (MLRS) FORMERLY KNOWN AS GENERAL SUPPORT ROCKET SYSTEM (GSRS)
6.43.16.A		FIRE AND FORGET - HELLFIRE
6.43.18.A		DIVISION AIR DEFENSE (DIVAD) GUN
6.43.21.A		JOINT TACTICAL FUSION PROGRAM
6.46.01.A		INFANTRY SUPPORT WEAPONS.

viii

BUDGET ACTIVITY
PROGRAM ELFMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME LI

NUCLEAR HUNITIONS IHPROVED 155MM NUCLEAR PROJECTILE ARHY SMALL ARMS PROCRAM COMBAT SUPPORT SYSTEMS.
ARMY SMALL ARMS PROGRAM
COMBAL SUPPORT STSTEMS
LETHAL CHEMICAL MUNITIONS
COUNTERNINE AND BARRIERS.
FIGHTING VEHICLE SYSTEMS (FVS)
LANDMINE WARFARE.
HODULAR PACK MINE SYSTEM (HOPMS).
TANK SYSTEMS.
COPPERHEAD (CANNON-LAUNCHED GUIDED PROJECTILE).
HIGH MOBILITY MULTIPURPOSE WHEELED VERTICLES (HRRWY)
FIRE SUPPORT TEAM VEHICLE (FISTY)
INDIRECT FIRE TRAINING MUNITIONS
TANK GUN COOPERATIVE DEVELOPMENT
120HH TANK GUN ANNO DEVELOPMENT
TANK GUN INTEGRATION
FIELD ARTILLERY AMMUNITION, 155MM
105HM TANK AMMINITION
VOLUME III
COMMUNICATIONS ENGINEERING DEVELOPMENT
TACTICAL MULTICHANNEL
JOINT TACTICAL INFORMATION DISTRIBUTION SYSTEM (JTIDS)
MODULAR INTEGRATED COMMUNICATION AND NAVIGATION SYSTEM (MICNS)
RADIOLOGICAL DEFENSE EQUIPMENT
•

. .

BUDGET ACTIVITY
PROCEASE ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME III

TACTICAL PROGRAM	n <u>s</u> (Continued)	PAGE NO.
6,47.09.A	IDENTIFICATION FRIEND OR FOE (IFF) EQUIPMENT	111-24
6,47.10.A	NIGHT VISION DEVICES	111-28
6,47,11.A	AIRCRAFT ELECTRONIC WARFARE (EW) SELF-PROTECTION SYSTEMS	111-32
DC52	SCOUT ATTACK RELICOPTER SURVIVABILITY SYSTEMS	111-39
0665	SPECIAL ELECTRONIC MISSION AIRCRAFT SURVIVABILITY SYSTEMS	111-43
6.47.12.A	US ARMY TACTICAL COMMAND, CONTROL, AND COMMUNICATIONS SYSTEMS ENGINEERING	111-47
0323	SYSTEMS ENGINEERING FOR ARMY TACTICAL COMMAND, CONTROL, AND COMMUNICATIONS (C3) SYSTEMS	111-56
6.47.13.A	COMBAT FEEDING, CLOTHING, AND EQUIPMENT	111-61
6.47.14.A	TACTICAL ELECTRIC POWER SOURCES	111-66
6.47.17.A	GENERAL COMBAT SUPPORT	111-71
1000	COMBAT ENGINEER EQUIPMENT	111-80
0429	TACTICAL RIGID WALL SHELTERS	111-85
6,47.18,A	PHYSICAL SECURITY	111-88
6.47.24.A	BIOLOGICAL DEFENSE MATERIEL	111-94
6.47.25.A	CHEMICAL DEFENSE MATERIEL	111-99
DO17	CHEMICAL BIOLOGICAL (CB) COLLECTIVE PROTECTION	111-104
DO 20	CHEMICAL DETECTION WARNING SAMPLING DEVICES	111-107
D023	COLLECTIVE PROTECTION MATERIEL-ARMORED VEHICLES	111-110
6.47.27.A	CUMMAND AND CONTROL	111-113
DC98 *	POSITION LOCATION REPORTING SYSTEM (PLRS)	111-121
D184	TACTICAL COMPUTER SYSTEM/TACTICAL COMPUTER TERMINAL (TCS/TCT)	111-131
6.47.30.A *	REMOTELY PILOTED VEHICLES (RPV'S)	111-134
₩_0040	REMOTELY PILOTED VEHICLES (RPV'S)	111-147
6.47.40.A	TACTICAL SURVEILLANCE SYSTEM	111-151
6.47.45.A	TACTICAL ELECTRONIC SUPPORT MEASURES SYSTEMS	111-155
6.47.46.A	AUTOMATIC TEST SUPPORT SYSTEM (ATSS)	111-160
Amended	HMCI ASSIFIED	

3/ New Project Added

BUDGET ACTIVITY
FROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME 111

TACTICAL PROGRAMS	(Continued)	PAGE NO
6.47.48.A *	STANDOFF TARGET ACQUISITION SYSTEM (SOTAS)	111-163
6.47.50.A	TACTICAL ELECTRONIC COUNTERMEASURES SYSTEMS	111-176
DL12	COMMUNICATIONS ELECTRONIC COUNTERMEASURES SYSTEMS	111-181
6.47.79.A	JOINT INTEROPERABILITY OF TACTICAL COMMAND AND CONTROL SYSTEMS (JINTACCS)	111-185
D309	JOINT INTEROPERABILITY OF TACTICAL COMMAND AND CONTROL SYSTEMS (ARMY)	111-191
D310	JOINT INTEROPERABILITY OF TACTICAL COMMAND AND CONTROL SYSTEMS (EXECUTIVE AGENT)	111-200
6.57.10.A	JOINT CHEMICAL/BIOLOGICAL CONTACT POINT AND TEST	111-204
6.57.13.A	BATTLEFIELD SYSTEMS INTEGRATION	111-208
. 2.37.24.A *	HEAVY ANTITANK/ASSAULT WEAPON SYSTEM (TOW)	111-209
2.37.26.A	ADVANCED FIELD ARTILLERY TACTICAL DATA SYSTEM	111-220
2.37.30.A +	CHAPARRAL	111-227
.년 2.37.31.A *	SURFACE-TO-AIR MISSILE HAWK/HAWK IMPROVEMENT PROGRAM (SAM HAWK/HIP)	111-245
₩ 2.37.35.A	COMBAT VEHICLE IMPROVEMENT PROGRAM	111-256
₩ p330	XMI TANK IMPROVEMENTS	111-263
2.37.39.A	AN/TSQ-73 HODIFICATIONS	111-267
2.37.40.A	FORCE LEVEL AND MANEUVER CONTROL SYSTEM	111-271
2.80.10.A	JOINT TACTICAL COMMUNICATIONS PROGRAM (TRI-TAC)	111-276
D104	JOINT TACTICAL COMMUNICATIONS (TRI-TAC) OFFICE	111-286
D107	MOD TO ARMY TRI-TAC INTERFACE	111-290
D110 *	MOBILE SUBSCRIBER EQUIPMENT (MSE)	111-292
D119	MODULAR RECORD TRAFFIC TERMINAL (MRTT)	111-296
D222 *	AUTOMATIC COMMUNICATIONS CENTRAL OFFICE, AN/TTC-39	111~300
3.31.42.A *	SATELLITE COMMUNICATIONS GROUND ENVIRONMENT	111-313
D253	DEFENSE SATELLITE COMMUNICATIONS SYSTEM-DEFENSE COMMUNICATIONS SYSTEM (PHASE 11)	111-324
. D456	TACTICAL SATELLITE COMMUNICATION SYSTEMS	111-328
₩ 3.31.45,A	EUROPEAN COMMAND; COMMAND, CONTROL, AND COMMUNICATIONS SYSTEMS (EUCON C3 SYSTEMS)	111-331

1 Amended

UNCLASSIFIED

×í

BUINGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME III

	INTELLIGENCE AND	COMMUNICATIONS	PAGE NO.
	6.37,12.A	MAPPING AND GEODESY	111-335
v	6.42.01.A	AIRCRAFT AVIONICS	111-340
	6.47.16.A	MAPPING AND GEODESY	111-344
	6.47.78.A *	NAVSTAR CLOBAL POSITIONING SYSTEMS (CPS) USER EQUIPMENT	111-350
	1.28.14.A	SPECIAL PROGRAM	111-359
	3.13.07.A	FOREIGN SCIENCE AND TECHNOLOGY CENTER	111-360
	3.31.11.A	STRATEGIC COMMUNICATIONS (STARCOM)	111-365
	3.31.26.A	LONG HAUL COMMUNICATIONS (DCS)	111~369
	3.34.01.A	COMMUNICATIONS SECURITY (COMSEC) EQUIPMENT	111-373
	DEFENSEWIDE MISS	SION SUPPORT	
	6.37.18.A	ELECTRONIC WARFARE VULNERABILITY/SUSCEPTIBILITY	111-377
	D234	INTERDICTION, SUPPRESSION, AND COUNTERFIRE WEAPONS VULNERABILITY/SUSCEPTIBILITY	111-385
	D267	AIR DEFENSE WEAPON SYSTEM VULNERABILITY/SUSCEPTIBILITY	111-390
	6.37.38.A	NON-SYSTEMS TRAINING DEVICES (NSTD) DEVELOPMENT	111-395
	6.42.68.A	COMPONENT IMPROVEMENT PROGRAM , ,	111-400
	6.47.15.A	NON-SYSTEMS TRAINING DEVICES (NSTD) ENGINEERING	111-404
	D241	NON-SYSTEMS TRAINING DEVICES COMBINED ARMS	111-411
	6.47.26.A	METEOROLOGICAL EQUIPMENT AND SYSTEMS,	111-414
	6.51.02.A	US ARMY TRAINING AND DOCTRINE COMMAND (TRADOC) STUDIES AND ANALYSES	111-422
,	6.52.01.A	AVIATION ENGINEERING FLIGHT ACTIVITY,	111-427
V	6.53.01.A	KWAJALEIN MISSILE RANGE	111-431
	6.57.02.A	SUPPORT OF DEVELOPMENT TESTING	111-436
	DE95	US ARMY COLD REGIONS TEST CENTER	111-443
	D127	METEOROLOGICAL SUPPORT TO RDTE ACTIVITIES	111-446
	D618	AVIATION DEVELOPMENT TEST ACTIVITY	111-449

1 Amended

UNCLASSIFIED

xi i

BUDGET ACTIVITY
PROGRAM ELEMENT
PROJECT/SCIENTIFIC AREA/TECHNICAL AREA

VOLUME 111

MATERIEL SYSTEMS ANALYSIS
EXPLOITATION OF FOREIGN ITEMS
SUPPORT OF OPERATIONAL TESTING
TEST BOARDS
US ARMY TRAINING AND DOCTRINE COMMAND (TRADOC) INITIAL OPERATIONAL TEST AND
EVALUATION (10TE)
US ARMY OPERATIONAL TEST AND EVALUATION AGENCY (OTEA) INITIAL OPERATIONAL
TEST AND EVALUATION (10TE)
US ARMY TRAINING AND DOCTRINE COMMAND (TRADOC) SUPPORT EQUIPMENT
DEFENSE SYSTEMS MANAGEMENT COLLEGE
PROGRAMWIDE ACTIVITIES
COMMAND HEADQUARTERS SUPPORT
SPECIAL PURPOSE AND AUTOMATIC DATA PROCESSING EQUIPMENT
INTERNATIONAL COOPERATIVE RESEARCH AND DEVELOPMENT
TECHNICAL INFORMATION ACTIVITIES
US ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND (DARCOM) RANGES/TEST FACILITIES
YUMA PROVING CROUND
ABERDEEN PROVING GROUND
DUGWAY PROVING GROUND
WHITE SANDS MISSILE RANGE
ARMY ELECTRONIC PROVING GROUND
DOD MUNITIONS EFFECTIVENESS AND EXPLOSIVE SAFETY STANDARDS
DOD MUNITIONS EFFECTIVENESS
DOD HIGH ENERGY LASER SYSTEMS TEST FACILITY (HELSTF)
AUDIOVISUAL SUPPORT FOR RESEARCH AND DEVELOPMENT PROGRAM
ARMY MANAGEMENT HEADOUARTERS ACTIVITIES

*i i i

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.04.A DOD Mission Area: #121 - Ballistic Missile Defense Title: Ballistic Missile Defense Advanced Technology
Budget Activity: #3 - Strategic Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
1	Total for Program Element	119854	123222	126883	146623	Continuing	Not Applicable
D215	BMD Advanced Technology	119854	123222	126883	146623	Continuing	Not Applicable

- B. (B) 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 ballistic missile defense. The DS 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 ballistic missile defense capability that the US has maintained since the 1972 ABM treaty was entered into force.
- C. BASIS FOR FY 1982 RDTE REQUEST: The BMD Advanced Technology Program is designed to maintain the pace of BMD advanced development needed to aggressively search for an exploit innovative concepts as a guard against technological surprise. The FY 82 program objectives are to develop the technology which will provide a realistic exoatmospheric BMD option to be offered by and provide selected technology support for low-altitude BMD. Emphasis is to be placed on technology development to enhance producibility of hardened exoatmospheric optical sensors. Additional exoatmospheric target signature collection programs are to be initiated. Selected developments in hardening technology for enhanced low-altitude BMD survivability are to be initiated. Advanced technology programmed efforts are to be continued on radar technology, sensor technology, unique discrimination techniques, advanced data processing techniques, advanced interceptor missiles, and advanced BMD construct analysis.

11-1 C1, 31 Mar 81

Program Element #6.33.04.A DOD Mission Area: #121 - Ballistic Missile Defense Title: Ballistic Missile Defense Advanced Technology
Budget Activity: #3 - Strategic Programs

Current
Milestone Dates

Milestone Dates

Designating Optical Tracker Flight

And QTR FY 1982

None Shown

Millimeter Wave Module Tests

Current
Milestone Dates
Shown in FY 1981 Submission

None Shown

None Shown

Millimeter Wave Module Tests

And QTR FY 1982

None Shown

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

		<u>FY 1980</u>	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
1	RDTE Funds (Current requirements) Funds (as shown in FY 1981 Submission)	119854 120804	123222 132751	126883 143535	Continuing Continuing	Not Applicable Not Applicable

The decrease in FY 80 resulted from a \$950 reduction in the Advanced Technology Program due to increased fuel costs at Kwajalein Missile Range.

The decrease in FY 81 reflects the application of a general Congressional reduction for inflation and President Reagon's reduction in travel, consultants, furniture and inflation.

The decrease in FY 82 will result from the transfer of \$12,500 to Project 6.33.08.A, BMD Systems Technology Program, for use on the Low Altitude Defense Preprototype Demonstration program, a \$5,800 Army decrement, and \$4,434 added for civilian pay increase, higher fuel costs and increased inflation, plus a \$2,843 decrease for use of consultants and increased efficiencies.

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

11-2 C1, 31 Mar 81

••

Program Element: #6.31.04.A DOD Mission Area: #121 - Ballistic Missile Defense Title: Ballistic Missile Detense Advanced Technology Budget Activity: 13 - Strategic Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The major objectives of the BMD Advanced Technology Program are to maintain U.S. leadership in BMD technology, prevent technological surprise, support 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 upgrading of state-of-the-art terminal defense systems with non-nuclear 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 endorthospheric and exoatmospheric interceptor missiles. Long wave infrared (LMTR) optical sensor technology has been developed allowing long-range target acquisition, discrimination, and tracking from missile-bothe sensors. Non-nuclear homing kill vehicle technology has been developed and ground tested. Solid state radar techniques have been developed which allow for smaller, higher power, less expensive radars for terminal defense. Considerable progress has been achieved in directed energy weapon (DEW) 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 defenses pressing toward demonstrations of exoatmospheric systems and exploitation of potential space-based defense concepts. Terminal defense technology advancement will pursue optical airborne adjuncts, non-nuclear kill constructs, and technology development of low-cost, rapidly manufacturable, rapidly deployable interceptors to achieve non-nuclear defense of point targets.
- G. (U) <u>RELATED ACTIVITIES</u>: The BMD Advanced Technology Program is fully coordinated with related programs being sponsored by other Army, other DOD, and other Government agencies. Included are Army Materials and Mechanics Research (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 Flight Test Measurements (PE 6.33.11.F), and DOE Particle Beam Technology programs. 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 currently are: Massachusetts Institute of Technology, Lincoln Laboratory, Lexington, MA; the Boeing Company, Seattle, WA; McDonnell Douglas Corporation, Huntington Beach, CA; Rockwell international Corporation, Anaheim, CA; and Honeywell, Inc., Minneapolls, MN. There will be approximately one hundred additional contractors and other Government agencies for an additional estimated dollar value of \$99 million. The developing organization responsible for the program is the Ballistic Missile Defense Advanced Technology Center, Huntsville, AL.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1980 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, commercial data processors for BMD use. The design of a modular missile-borne computer that is capable of performing a multiplicity of data processing functions on board the interceptor missile was completed. The assessment of directed energy weapon technology for BMD

Program Element: #6.31.04.A

DOD Mission Area: #121 - Ballistic Missile Defense

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

applications was initiated. The Designating Optical Tracker (DOT) Flight Test Program to verify LMIR sensor performance in a realistic BMD environment was initiated and three successful flight tests have been conducted to date. Development of the technology base to provide the potential for the utilization of non-nuclear kill (NNK) devices in endoatmospheric ballistic missile defense. 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 Forward Acquisition Sensor^(FAS) integrated ground test program was initiated to resolve technological issues associated with early warning and attack assessment for BMD systems.

2. FY 1981 Program: The FY 81 BHD Advanced Technology Program is structured to address BMD technology within the context of overall program objectives. The radar program will continue to be a broadly-based technology effort covering the major frequency regimes (microwave, millimeter, and micrometer) and stressing cost reduction, rapid deployment, component hardening, and improved information gathering. Emphasis will continue on the development of millimeter wave and solid state X band radar technology. The optics technology program will provide for: one Designating Optical Tracker (DOT) flight; the continued development of mosaic sensor technology; and demonstration of a testbed capability for mosaic technology components. The discrimination technology program will include continued installation of the COBRA JUDY shipborne data collection radar, and preparation of specification, supporting the initiation and hardware procurement for an airborne optical data gathering platform. The data processing program will provide for development of a laboratory prototype of a modular missile-borne computer to address the stressing on-board data processing requirements of BMD systems. Critical research issues for distributed data processing in a BMD scenario will be emphasized to provide high performance configurations and computer architecture for BMD systems. The interceptor program, will continue critical interceptor component testing; conduct full-scale tests of a missile forebody fabricated from advanced materials; and initiate the design of subsystems for the Endo NNK program will be emphased. Hardware procurement for the Endo NNK program will be emphased.

warhead subsystems for the Endo NNK program will be conducted. Hardware procurement for the Forward Acquisition Sensor (FAS) integrated ground test program will be initiated. Evaluation of strategic options from a defense viewpoint will be continued. Critical component developments for a near-term, low-altitude defense system will be continued.

3. FY 1982 Planned Program: The FY 82 BMD Advanced Technology efforts will include research and hardware purchase in the areas of:
advanced sensors, unique discrimination techniques, advanced data processing networks and software, advanced endoatmospheric and excatmospheric interceptors, and advanced BMD construct analysis. The radar technology program will include: Initial Operating Capability (IOC) for an improved signature measurements radar at Kwajalein; the testing of Millimeter Wave (MMM) radar
modules; and
at Kwajalein. The optics technology program will provide for the testing of a tenelement, hardened optical array; the development of a laser vulnerability prediction model; and one Designating Optical Tracker
(DOT) Filght. The discrimination technology program will include
procurement and continued design and fabrication of the sensor for an airborne optical platform for use in obtaining an LMIR data
base needed for optical discrimination development; continued acquisition and analysis of field test data on often ive threat

Program Element: #6,33,04,A
DOD Mission Area: #121 - Ballistic Missile Defense

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

vehicles and penetration aids. Data processing technology will include: demonstration of a dynamically reconfigurable architecture; demonstration of a real-due processor prototype; and demonstration of real-time processor and memory allocation under decentralized control. The interceptor technology program will complete design review for test hardware for an improved direct impact kill vehicle prototype; initiate fabrication of MMW fuze components; and complete proof-of-principle tests for an advanced programmable auto pilot. Critical technology integration and flight test planning for the Endoatmospheric NNK program will be continued. Analytical simulations and pre-testing of components for the Forward Acquisition Sensor (FAS) integrated ground test program will be continued. Technology assessment and integration programs will be continued.

4. FY 1983 PLANNED PROGRAM: Critical technology integration and flight test planning will be completed for the irregram to allow for flight experiment decisions. Design and fabrication of sensor components data processor and associated hardware relating to an integrated ground test of will be continued. A series of will be finitiated. Design and development of the integrated ground test of an will continue. Technology assessment and integration programs will continue.

5. (U) PROGRAM TO COMPLETION: This is a continuing program.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.08,A DOD Mission Area: #1/1 - Ballistic Missile Defense Title: Ballistic Missile Defense Systems Technology Program
Budget Activity: #3 - Strategic Programs

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

Project Number	<u>Ti</u> cle	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
1	TOTAL FOR PROGRAM ELEMENT	120814	181038	301685	263143	Continuing	Not Applicable
D991	BMD Systems Technology Program	120814	181038	301685	263143	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides a hedge against the strategic uncertainties associated with the ballistic missile threat to the United States by providing for BMD systems technology research and development activities which will advance BMD systems state-of-the-art technology; maintain the capability to initiate design and development of a deployable BMD system, if directed; conduct systems definition studies; and test selected components in a systems context to assess responsiveness to a variety of BMD missions.

C. BASIS FOR FY 1982 RDTE REQUEST: This program provides for the definition of tactical BMD systems, the resolution of key exoatmospheric system (some in the Homing Overlay Experiment and validation of endoatmospheric issues in the Low Altitude Defense (LoAD) Proprototype Demonstration (PPD) Program. The Hole will complete fabrication, assembly and in-plant testing of flight interceptors, along with system integration and testing of ground test units. First flight tests will be conducted. The LoAD PPD Program will continue with systems engineering hardware/software design and preparation for hardware fabrication.

Major Milestones

Milestone Dates

Milestone Dates Shown in FY 1981 Submission

lst Homing Overlay Experiment Flight June 1982

Completion of Low-Altitude Defense Preprototype Demonstration

11-6 (1, 31 Mar 81

Program Element: 16.33.08.A
DOD Mission Area: 121 - Ballistic Missile Defense

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

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1981 Sub-	120814 120814	181038 133503	301685 188620	Continuing Continuing	Not Applicable Not Applicable

The increase in FY 81 reflects a \$15 million increase by Congress to preserve the option to accelerate the LoAD PPD and a \$39 million Supplemental to be provided Congress to accelerate the LoAD PPD. This program was also reduced a provata share of the Congressional Inflation cut to the FY 81 Army R&D appropriation and for increased efficiencies.

The increases in FY 82 reflects a \$26 million increase in LoAD PPD costs caused by MX design changes and a \$90 million amendment provided to Congress to accelerate the LoAD PPD offset slightly by decreases for improved efficiencies.

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

UNCLASSIFIED

11-7 C1, 31 Mar 81

Program Element #6.33.08.A DOD Mission Area: 1121 - Ballistic Missile Defense Title: Ballistic Missile Defense Systems Technology Program Budget Activity: 13 - Strategic Programs

- (U) DETAILED BACKGROUND AND DESCRIPTION: The Site Defense Program was initiated in FY 1971 to conduct prototype demonstration a defensive system against Soviet ballistic missile improvements which were becoming a threat to the US MINUTEMAN local. The FY 1975 and FY 1976 Congressional budget authorization hearings directed reorientation of the Site Defense Program from prototype demonstration to systems technology advancement and redesignated the program as the Ballistic Missile Defense Systems Technology Program (STP). The reoriented program investigates systems capable of defending a variety of national strategic targets with primary emphasis on defense of land-based intercontinental ballistic missiles. The primary objective of the STP is to retain a posture from which a full-scale development program can be initiated if required, which will result in a cost-effective ballistic missile defense system which incorporates the most advanced technology and provides an acceptable leadtime to deployment. The program is in consonance with the US Strategic Arms Limitation Agreements, the US strategic offensive nuclear arms research and development community and the US ballistic missile intelligence community.
- (U) RELATED ACTIVITIES: Related activities include testing at the Kwajalein Missile Range, Program Element 6.53.01.A, and the Ballistic Missile Defense Advanced Technology Program, Program Element 6.33.04.A. The Systems Technology Program is designated to validate and merge mature technology into BMD systems while Advanced Technology Programs explore technology associated with specific program objectives. Kwajalein Missile Range provides the support and test facilities for test and evaluation of the Bailistic Missile Defense Systems Technology Program. These programs are centrally managed to avoid duplication of art.
- (U) WORK PERFORMED BY: Contractors include: McDonnell Douglas Astronautics Company, Huntington Beach, CA; Lockheed Missiles and Space Co., Sunnyvale, Cd; Honeywell, Inc., Avionics Division, St. Petersburg, FL; Honeywell, Inc., Defense Electronics Div., Lexington, MA; Rockwell International, Rocketdyne Div., Canoga Park, CA; Martin-Marietta Corporation, Orlando, FL; Teledyne Brown Engineering Co., Inc., Huntsville, AL, Kaman Sciences Corp., Colorado Springs, CO; and General Electric Co., Syracuse, MY. Government agencies; Supporting government agencies include: Army Materials and Mechanics Research Center, Watertown, MA; San Antonio Air Logistics Center, Kelly AFB, Texas; and US Army Missile Command, Huntsville, AL. The developing organization responsible for the program is the Ballistic Missile Defense Systems Command, Huntsville, AL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS

1. (U) FY 1980 and Prior Accomplishments: In 1975, the Site Defense Program was restructured from a prototype demonstration to one of validating key technology issues. The Technology Validation Program (TVP) continued the design and development of site defense hardware/software for initial bulk filtering, discrimination and realtime data processing. The validation testing of this hardware/software was completed in FY 80 and final data reduction and analysis are continuing. The TVP was highly successful and these technology issues appear resolved for the system context tested. The data processing effort continued in order to investigate distributed data processing as a means to increase throughout. Technical studies on the layered defense system concepts, and analysis. distributed data processing as a means to increase throughput. Technical studies on the layered defense system concepts, and analysis for defending a variety of strategic national assets continued. Studies were completed in FY 80 which showed the potential contribution of BMD to nuclear deterrence and concluded that a potential mission for BMD systems in the 1990s includes the defense UNCLASSIFIED

Program Element: #6.33.08.A DOD Mission Area: #121 - Ballistic Missile Defense

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

of ICBMs and other high value targets. Selection of an interceptor Systems Integration Contractor (ISIC) and initial development work was initiated for the Homing Overlay Experiment (HOE) in Aug 78. The preliminary design review for the HOE was completed in Nov 79. The HOE design was continued and fabrication and assembly of hardware was begun for design verification testing; seven major subcontractors began design verification tests for the Infrared sensor, warhead, propulsion system, guidance system, ground support equipment, data processing hardware/software compatibility, and electronic control systems. Construction of required HOE test facilities at Kwajalein Missile Range was begun in FY 80. The first complete interceptor ground test unit was begun. Hardware testing, augmented by system simulation, was performed and procurement of the first interceptor ground test unit was begun in eary FY 80. Advanced data processing hardware configuration experiments were continued and the detailed design of a facility to support the development of tactical distributed data processing software was initiated. Two Systems Technology Reentry Vehicle Experiment Program (STREP) dedicated targets were flown to complete the evaluation of the discrimination performance of the Site Defense Radar and to provide Soviet-like reentry vehicle data. Mothballing of the Systems Technology Test Facility was begun after the last STREP flight in Sep 80. System Analysis was completed in FY 79 for the Low Altitude Defense (LoAD) Preprototype Demonstration (PPD), and cost and schedules were developed during CY 79. The LoAD PPD began in FY 80 with major effort directed toward system definition and source is lection of contractors for the Sensor and Engalcment Controller. Definition work continued on the interceptor subsystem and green! support equipment areas.

- 2. FY 1961 Planned Program: The design verification testing of the Homing Overlay Experiment (HoE) component hardware will be completed and a critical design review is scheduled for Dec 80. Complete fabrication and assemble of the Hight test units for the Homing and Kill phase of the HOE will begin and continue throughout the year. The ground support unit system integration testing will be completed in CONUS and testing will begin at Kwajalein Missile Range (KMR). Construction of test facilities will be completed at KMR for the first HOE flight test scheduled in The Systems Technology Test Facility (STTF) will be closed, and personnel and some equipment will be returned to CONUS. System functional design for the Low Altitude Defense Proposody, and personnel and some equipment will be returned to CONUS. System functional design for the Low Altitude Defense Proposody design for the SEC radar subsystem, development and testing of radar brassboard models, engineering modeling, and blast radiation analysis for the interceptor altoproper guidance subsystem, wind tunnel tests of the proposed interceptor and guiration, and design and development of the propulsion system will also be initiated. A competitive effort to define BMD system oncepts for the 1990 time frame will examine defense of ICBMs and other high value targets.
- 3. FY 1982 Planned Program: The Low Altitude Defense Preprototype Demonstration will continue with system engineering and development and testing components for the Senset and Engagement Controller (SEC) and interceptor. Hand are and software development and testing will continue for the data processing and support equipment. The System Design Review (DB) will be held during 2nd Qrr, FY 82 and preliminary design reviews are scheduled for the SEC and interceptor equipment during the 3rd Qtr. The flight test program for the Homing Overlay Experiment (HOE) will start in FY 82. The fabrication, assembly and test of the four HOE flight interceptors will be completed, along with system integration and test of the ground test units. First and second interceptor

Program Element: 46,33,08,A DDD Mission Area: 4121 - Ballistic Missile Defense Title: <u>Ballistic Missile Defense Systems Technology Program</u>
Budget Activity: <u>f1 - Strategic Programs</u>

flights will be flown in respectively against dedicated MINUTEMAN-I reentry vehicles which will be instrumented for lethality evaluation. Based on the results of the competitive effort in FY 81, a single contractor will be selected to initiate system design and validation of the BMD System for the 1990s.

4. FY 1983 Planned Program: The Low Altitude Defense Preprototype Demonstration will continue with detail design of the Sensor and Engagement Controller (SEC). Bata processing hardware and software design release is scheduled for early FY 83. Interceptor preliminary design studies will be completed.

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

11-10

- -

UNCLASSIFIED FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.32.15.A
DOD Mission Area: #225 - Air Warfare Support

Title: Joint Survivability Investigations
Budget Activity: 44 - Tactical Programs

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

Project <u>Number</u>	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 600	FY 1981 Estimate 645	FY 1982 Estimate 948	FY 1983 Estimate 1130	Additional To Completion Continuing	Total Estimated Costs Not Applicable
D079	Joint Survivability Investigations	600	645	948	1130	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This Program Element provides the Army's contribution to the Tri-Service Joint Aircraft Survivability Program. The program operates under the aegis of the Joint Logistics Commanders, and is conducted by the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS). All efforts are directed at Improving the survivability of US aircraft in the nonnuclear threat environment to increase assets available/sorties possible over a given period of conflict. In addition to coordination of research and advanced development programs of the Services, these resources are applied to efforts that have been identified by Tri-Service working groups to be critical, technology void-filling projects. They are anticipated to provide low-risk, high-payoff technology for two or more services. Research conducted is in support of and complementary to the Required Operational Capability (ROC) for Aircraft Survivability Equipment. The JTCG/AS mission is to: (1) coordinate research and advanced development efforts and plan and propose joint critical technology programs contributing to the reduction of vulnerability and the improvement of survivability in aeronautical systems in a combat environment; (2) review and analyze data on combat damage; (3) conduct studies of future threat environments to determine survivability requirements and to assess enhanced survivability design features; (4) plan and coordinate joint service tests and maintain cognizance over single service tests to validate improved antivivability design features. The JTCG/AS is required by its charter to promote survivability/vulnerability as a design discipline and coordinate research and development results among the services and industry.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Based upon analysis of combat experience in Southeast Asia, intelligence gathered from the 1973 Hideast conflict, and the latest threat data available, the JTCG/AS, in conjunction with the research and development organizations of the Joint Logistics Commanders, developed an overall technology plan to provide the knowledge required for the design of combat-survivable aircraft and equipment. This program element funds the Army portion of the joint plan. The FY 1982 submittal includes support for the Combat Data Information Center; continued engine vulnerability tests; develop canopy laser countermeasure for integration in preliminary design phase; develop and process related military standards; complete development of low-cost pilot seat/armor; advanced small engine vulnerability reduction; study durability payoff of survivable engine design; high-power transmission systems vulnerability reduction; evaluate effects of nonferrous

UNCLASSIFIED

Program Element: #6.32.15.A

DOD Mission Area: #225 - Air Warfare Support

UNCLASSIFIED
Title: Joint Survivability Investigations
Budget Activity: 4 - Tactical Programs

material fractures on engine survivability; continued support of IR measurements standardization; Full Authority Digital Electronic Engine Control (FADEC) for increased engine survivability; control signal transmission efforts; and analysis of helicopter combat damage repair.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated <u>Cost</u>
RDTE Funds (current requirements)	600	645	948	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	600	693	914	Continuing	Not Applicable

Differences in funding profiles between the FY 1982 and the FY 1981 Congressional Descriptive Summaries reflect program adjustments for inflation. The FY81 decrease reflects the application of general Congressional reductions.

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

UNCLASSIFIED

Program Element: #6.32.15.A

DOD Mission Area: #225 - Air Warfare Support

Title: Joint Survivability Investigations
Budget Activity: 14 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: In 1971, a Joint Technical Coordinating Group on Aircraft Survivability (ITCG/AS) was established under the Joint Logistics Commanders Group to acquire and make available technology for designing nonnuclear survivability enhancements into new aircraft. The JTCG/AS is chartered to: (1) implement interservice efforts to reduce nonnuclear vulnerability of aircraft, (2) coordinate research and advanced development in nonnuclear survivability, and (3) maintain liaison between technology experts and those actually designing new aircraft. In 1972, the JTCG/AS formulated a tri-Service nonnuclear survivability program named Test and Evaluation Aircraft Survivability (IEAS). The TEAS program was approved by the Under Secretary of Defense for Research and Engineering (USDRE), and \$10 million in USDRE funds were allocated for the program over a three-year period (FY 1973-FY 1975). As a technology-oriented program, TEAS involved experiments to strengthen the data base, evaluate prototype hardware, and develop engineering theory and design criteria. A USDRE decision in early FY 1975 called for further nonnuclear survivability efforts to be budgeted by each of the services beginning in FY 1976. (Interservice coordination continues under the JTCG/AS). The objective of this program element is to support the Army portion of the overall nonnuclear survivability efforts of the Department of Defense.
- G. (U) RELATED ACTIVITIES: This program is related to Army, Air Force, and Navy programs to insure improved aircraft survivability in nonnuclear threat environments. Coordination of these efforts is accomplished through a JTCG/AS Central Office staffed by service representatives from each command represented on the Joint Logistics Commanders Group. Duplication is avoided through joint reviews by that office and individual Service task agencies. This program is specifically related to Army Program Element numbers 6.37.11.4/D852, Scout/Attack Helicopter Survivability Equipment; 6.37.114/D653, Special Electronic Mission Aircraft Survivability Equipment; 6.47.11A/DC52, Scout/Attack Helicopter Survivability Systems; 6.47.11A/D665, Special Electronic Mission Aircraft Survivability Systems. It is coordinated with and complementary to Air Force and Navy Programs (Program Element numbers 6.32.44.F and 6.32.62.N respectively). Additionally, coordination is effected with existing and planned programs of the Federal Aviation Administration, NASA, and plans are being developed for exploration of coordinated efforts with NATO.
- H. (U) WORK PERFORMED BY: Ballistic Research Laboratory, Aberdeen Proving Ground, MD; US Army Research and Technology Laboratory, Fort Eustis, VA; Naval Research Laboratory, Washington, DC; US Army Materials and Mechniles Research Center, Watertown, MA; Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, OH.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: In FY 1980 and prior years this program accomplish i efforts in the areas of survivability and vulnerability assessment methodologies, design criteria development, and hardware feasibility studies and investigations. Efforts included aircraft engine vulnerability baseline tests, laser vulnerability unalysis procedures, determination of damage tolerances, and the characterization of battle damage to composite structures, development of design enhancement features contributing to flight control systems for the AH-1G, UH-1, and OH-58 helicopters. The program completed extensive surveys of infrared measurements facilities capabilities and prepared a nine-chapter infrared Heasurement

UNCLASSIFIED

Program Element: #6.32.15.A DOD Hission Area: #2.25 - Air Warfare Support Title: Joint Survivability Investigations
Budget Activity: #4 - Tactical Programs

Guide; completed DOD coordination on military standards for Aircraft Nonnuclear Survivability Programs and Aircraft Nonnuclear Survivability/Vulnerability terms; placed Military Handbook for Aircraft Nonnuclear Survivability into final coordination cycle. Fabricated and ballistically tested electro-slag-remelt steel plates for use in helicopter pilot seat armor, augmented an optical countermeasures effectiveness model to reflect threats to helicopters in nap-of-the-earth (NOE) environments, completed initial development and testing of radar-attenuating, thermal/ballistic-tolerant composite structural

- 2. (U) FY 1981 Program: Standardization of infrared (IR) measurement test and reporting procedures; field testing of laser visual aerosol countermeasures; development of helicopter canopy strips as a laser countermeasure; maintenance of the Combat Data Information Center (CDIC); develop and process related military standards; develop low-cost pilot seat/armor, evaluate high-performance armor materials; develop powder-filled structural panels for fire protection; develop/evaluate composite structural elements integrating radar/IR/Laser/ballistic protection; develop Full Authority Digital Electronic Engine Control (FADEC); evaluate engine rapid damage repairability; refine engine combat damage prediction methodology, evaluate feasibility of control signal transmission through structures.
- 3. (U) FY 1982 Planned Program: Develop canopy laser countermeasures for integration in preliminary design phase; develop and process related military standards; complete development of low-cost pilot seat/armor, advanced small engine vulnerability reduction; study durability payoff of survivable engine design; high-power transmission system vulnerability reduction; evaluate effects of nonferrous material fractures on engine survivability; continue support of IR measurements standardization, CDIC, FADEC, engine damage prediction, and control signal transmission efforts shown in FY 1981 plan above; analysis of aircraft/helicopter combat damage repair.
- 4. (U) FY 1983 Planned Program: Continue development/evaluation of canopy laser countermeasure; develop standards for radar cross-section measurements; develop and process military standards; evaluate of high performance armor materials; evaluate transparent armor materials; continue FY 1982 efforts in small engine vulnerability reduction, high-power transmission vulnerability reduction, effects of nonferrous material fractures on engine survivability; and complete FADEC effort initiated in FY 1981; evaluate battle damage repairability of composite material structures; develop combat damage-tolerant shaft for drive-train components; develop component vulnerability/ballistic resistance data.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

FY 1982 RDTE C'NGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.03.A

Title: MLRS Terminal Guidance Warhead (TCW) formerly
Surface-to-Surface Missile Rocket System
Budget Activity: #4 - Tactical Programs

DOD Mission Area: #212 - Fire Support

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

Project <u>Number</u>	Title TOTAL FOR PROGRAM ELEMENT	FY 1983 Actual 1000	FY 1981 Estimate 790	FY 1982 <u>Estimate</u> 3057	FY 1983 Estimate 16785	Additional to Completion 170842	Total Estimated Cost 192474
D216	(MLRS Terminally Guided Warhead)	1000	790	3057	16785	170842	192474
	Quantitles	0	0	0	0	To Be Determin	ed

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The concept of a Terminal Guidance Warhead (TGW) for the Multiple Launch Rocket System (MLRS) envisions the attack of armored targets from above using highly accurate and lethal submunitions dispensed from an MLRS rocket. There is an urgent need for an autonomous, terminal homing, indirect fire-and-forget capability to defeat hardpoint targets such as armored vehicles and equipment before they are committed into the central battle, thereby reducing their presentation rate. The TGW for the MLRS will contain from one to six terminally guided submunitions packaged within the rocket warhead section. The Army intends to develop this warhead in cooperation with France, Germany, and the United Kingdom.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Four concept definition study contracts will be awarded to define the MLRS TGW concept and development program. These studies will propose:
 - 1. (U) Terminally Guided Submunition Design
 - 2. (U) Warhead Packaging Concept
 - 3. (U) Dispersal System Concept and Design
 - 4. (U) Warhead/Fire Control System Interface Solutions

Program Element: 16.33.03.A

Title: MLRS Terminal Guidance Warhead (TGM) formerly
Surface-to-Surface Missile Rocket System
Budger Activity: 44 - Tactical Programs

DOD Mission Area: 1212 - Fire Support

- 5. (U) International Industrial Teaming Arrangements
- 6. (U) System Cost Effectiveness Analysis
- 7. (U) System Total Cost and Schedule

A multinational (US/UK/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 seker 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:

Major 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
October 1982
May 1983

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

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

DDT6	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	1000	790 -	3057	187627	192684
Funds (as shown in the FY 1981 submission)	984	2692	34533	144099	182308

Program Element: #6.33.03.A

Title: MLRS Terminal Guidance Warhead (TGH) Grmerly
Surface-to-Surface Missile Rocket System
Budget Activity: 14 - Tactical Programs

DOD Mission Area: #212 - Fire Support

Monetary requirements have been reprogramed based upon more current planning which includes quadriliteral negotiations in advance of the conduct of concept definition studies planned for FY 1982.

E. (U) OTHER APPROPRIATION FUNDS: Provided that the US does enter into a joint development program with its European partners, those nations will fund a portion of the development costs. The proportionate shares to be funded by each nation will be determined after completion of Concept Definition studies and during negotiations of the Validation Phase Memorandum of Understanding. With the exception of the Concept Definition Phase, the current profile assumes that the US is proceeding unilaterally. Therefore it is probable that the US share will be decreased. At this time, there are no other US appropriations visualized for the program.

UNCLASSIFIED

Program Element: #6.33.03.A

DOD Mission Area: #212 - Fire Support

Title: MLRS Terminal Guidance Warhead (FGW) formerly
Surface-to-Surface Missile harket System
Budget Activity: 14 - Tactical Programs

F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: Efforts to provide an indirect fire terminal homing capability were initiated in 1970 on the hypothesis that a terminally guided system could be effective if delivered by a parent system to a preselected point in space, dispersed from a delivery vehicle, and caused to decelerate to a low velocity, allowing time for a seeker to automatically scan, locate, track, and guide the homing missile to the target. Between 1971 and 1976 a series of demonstration tests were conducted. In conjunction with these tests, basic seeker technology was being improved. Emphasis was placed on infrared and millimeter wave seekers. Subsequent studies conducted by the Army, although limited in scope, have shown that smart or guided munitions provide large increases in both mission and cost effectiveness. In June 1976, the FY 1977 Authorization Conference Report authorized \$5 million to the MLRS program with the understanding that the Army would include a terminal homing 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 joint development program. This admonshment was repeated in the Defense Systems Acquisition Review Council (DSARC) I decision memorandum in February 1977. The Culver-Nunn legislation was quoted to emphasize both admonshments. 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 Hemorandum of Understanding (MOU) which was quadrilaterally executed in July 1979. During negotiation of this MOU, it became clear that the Europeans desired to fully participate in the management of a future development of a Terminally Guided Warhead if one should be required. The MOU was followed by a quadrilaterally developed Material Equipment Characteristics Document which was signed in

- 1. (U) Conduct of joint studies for Concept Definition
- 2. (U) Development of a quadrilaterally approved Request for Proposal
- 3. (U) Joint evaluation of contractor proposals on the basis of the following consideration:
 - (a) (U) Cost
 - (b) (V) Schedule
 - (c) (U) Technical
 - (d) (U) Multinational work-sharing arrangements
 - (e) (U) Management

4. (U) Joint funding for Concept Definition not to exceed \$2 million per nation (subject to availability of nationally authorized/appropriated funds).

Program Element: #6.33.03.A

Title: MIRS Terminal Guidance Warhead (TGW) formerly
Surface to Surface Missile Rocket Gystem
Budget Activity: #4 - Tactical Programs

DOD Mission Area: #212 - Fire Support

- 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. 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 unilaterally 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 Engineerig in July 1979, commits the US to perform joint 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 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 long-range antiarmor capability. The resulting DARPA technology demonstration, known as "Assault Breaker," will use a long-range Army carrier 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 to November 1981. The Army, 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 submunitions. Although Assault Breaker was not initiated to validate MLRS-TGW, MLRS has influenced how DARPA has proceeded through the initial stages of its demonstrations. The most significant MLRS influence is the sizing of the TGSM. DARPA's TGSM was sized 4" x 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 TGSM. The MLRS-TGW program schedule was also established so that the Concept Definition studies would begin just as the Phase III Assault Breaker demonstrations terminated. This plan will assure the availability of a maximum amount of data, both to contractor and government representatives. These data will also be available to the team that will evaluate the Concept Definition studies. The Assault Breaker seeker technology will provide the baseline for the MLRS-TGW. Day-to-day involvement of the Army Missile Command's Advanced Systems Concepts Office in the Assault Breaker demonstrations assures that the potential for duplication between Assault Breaker and MLRS-TGW is minimized
- H. (U) WORK PERFORMED BY: This program is managed by the MLRS Project Manager. A contractor has not been selected. The Vought Corporation of Dallas, Texas, prime contractor for the MLRS, will integrate the TGW with the basic MLRS system.

UNCLASSIFIED

Program Element: #6.33.33.A

Title: MLRS Terminal Guldance Warhead (TGW) formerly
Surface-to-Surface Missile Rocket System
Budget Activity: 14 - Tactical Programs

DOD Mission Area: #21! - Fire Support

- 1. (II) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: No funds were appropriated for TGW from FY 1976 through FY 1979, but the Army Missile Command participated in forums and conducted studies to determine the applicability of a TGW to the MLRS. These efforts included: (a) General Support Rocket System Special Study Group 1976, (b) Department of the Army Torminal Guidance Symposium 1978, (c) General Support Rocket System Terminal Guidance Warhead Development Plan 1978, (d) Continued studies by the Advanced Systems Concept Office 1979.
- 2. (U) FY 1981 Prigram: Continuation of Pre-Concept Definition planning and evaluation efforts by the Army Missile Laboratory, Ballistics Research Laboratory, Harry Diamond Laboratories, Vought Corporation, Multinational Source Selection Board, and the Project Office.
- 3. (0) FY 1982 Floring Program: Approximately four contracts will be awarded for performance of Concept Definition studies.
 - 4. (U) FY 1983 Plunned Program: A Validation Phase R&D contract will be awarded and R&D efforts will be initiated.
- 5. (II) Program to Completion: Tentative IOC planned for FY 1990. This date must be reviewed after accomplishment of concept definition stulies.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.07.A DOD Mission Area: #211 - Close Combat

Title: Short-Range Air Defense Self-Protect Weapon Budget Activity: 44 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual	FY 1981 Estimate 6842	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion 0	Total Estimated Cost 0
D053	Air-To-Air STINGER	0	6842	0	0	0	U
DB60	Air Defense Supression System	0	0	0	θ	0	D

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program was intended to provide a Multipurpose Lightweight Missile (MLM) System required by Army attack/scout helicopter teams for self-protection against armed hostile alreraft. The MLM system would enable friendly scout helicopters during their normal employment to effectively engage aerial threat aircraft at ranges which allow minimum exposure and high probability of survival. Current aircraft weapon systems were not designed to counter the air-to-air threat and are not effective against that threat. Full-scale development of the MLM System would be based upon the STINGER/STINGER-POST manportable missile and a launcher assembly and would be common to a future air defense suppression version of the MLM system. This was originally planned for a 1983 start. The STINGER missile is in production and possesses the proper combination of weight, range, and lethality for these applications. It would be a cost-effective insurance investment for the survivability of these aircraft.

C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: The Army did not fund the MLM system during the 1982 budget process. This program may be reinstated based on the results of an Army-directed analysis to determine the optimum, cost-effective measures to neutralize the armed aircraft threat to the scout/helicopter team.

UNCLASSIFIED

FY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.33.16.A DOD Mission Area: #213 Ground Air Defense Title: Advanced Rocket Control System

Budget Activity: #4 - Tactical Programs

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

Project Number	Title Total for Program ELEMENT	FY 1980 Actual 0	FY 1981 Estimate 25038	FY 1982 Estimate 15000	FY 1983 Estimate To Be Deter	Additional To Completion rmined	Total Estimated Costs
0692	Advanced Rocket Control System	9	26038	15000	To Be Deter	rmined	

- n. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Program content is SECRET "Limited Distribution Special Access Required," procluding further description in this summary. Access to information is controlled by the Deputy Chief of Staff for Research, Development, and Acquisition, Department of the Army.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Continue RDTE effort.
- D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands):

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
RDTE			,			
Finds (current requirements) Funds (as shown in FY 1981	0	26038	1,5000	To Be Dete	rmined	
(noles)mdus	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

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

UNCLASSIFIED

11-21 A Cl. 31 Mar 81

Program Element: #6.33.16.A

DOD Mission Area: #213 Groun1 Air Defense

Title: Advanced Rocket Control System
Budget Activity: 14 - Tactical Programs

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

	FY 1980 Actual	FY 1931 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army						
Funds (current requirements)	U	0	o	To Be De	termined	
Funds (as shown in FY 1981						
submission)	Not	Not	Not	Not	Not	Not
	Applicable	Applicable	Applicable	Applicable	Applicable	Applicable

UNCLASSIFIED

11-21 1 01, 31 Mar 81

Program Element: #6.33.16.A

DOD Mission Area: #213 Ground Air Defense

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

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: Details may be provided in accordance with paragraph B above.
- G. (U) <u>RELATED ACTIVITIES</u>: This project is related to work in other Army technology programs. Duplication of affort is avoided the to access to the project being strictly controlled and limited to specific Department of Detense individuals involved in managing related technologies.
- H. (8) WORK PERFORMED BY: Government in-house laboratories and contractors.
- I. (U) PROGRAM ACCOMPLISIBIENTS AND FUTURE PROGRAMS: Details may be provided in accordance with paragraph 8 above.

UNCLASSIFIED

11-21 C Ct, 31 Mar 81

INTENTIONALLY LEFT BLANK

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.13.20.A

rogram Element: 16.33.20.A

Title: Corps Support Weapon System (CSWS)

(Formerly Assault Breaker)

DOD Hission Area: 1222 - Close Air Support/Battlefield Interdiction Budget Activity: 14 - Tactical Programs

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

Nu	oject mber	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 9400	FY 1981 Estimate 14294	FY 1982 Estimate 11762	FY 1983 Estimate TBD	Additional To Completion Continuing	Total Estimated Costs Not Applicable To Be Determined
03	102	Corps Support Weapon System	9400	14294	11762	TBD	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND HISSION NEED: There is a requirement at corps to interdict and destroy second-echelon enemy forces at ranges beyond the capabilities of cannons and rockets. The Army plans to evaluate the integration of the Assault Breaker technologies, LANCE nuclear and antipersonnel/antimaterie) replacement requirements, and chemical warhead considerations together into a total Corps Support Weapon System (CSWS) program.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: FY 1982 funds will be used for continuation of development/evaluation of concept definition packages, selection of best technical approach, preparation of request for proposal for the validation phase, preparation/completion of ASARC/DSARC, and early resolution of design/packaging issues concerning various subsystems to reduce development risk. This effort will lead either to a validation and demonstration or full-scale engineering development phase in the FY 1982/1983 time frame.

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1981 Submission
Begin Assault Breaker Technology		
Demonstration	April 1978	April i 378
Mission Element Need Statement (MENS)		
Approvat	March 1981	May 1980
Begin Special Task Force	March 1981	None

UNCLASSIFIED

13-22 C1, 31 Hat 81

Program Element: #6.33.20.A

rogram Element: 6.33.20.A

Title: Corps Support Weapon (7.41cm (CSWS)

(Pormerly Assault Brewer)

DOD Mission Area: #222 - Close Air Support/Battlefield Interdiction Budget Activity: 14 - Tactical Programs

Milestone Dates Shown in FY 1981 Submission Major Milestones Complete Assault Breaker Milestone Dates Technology Demonstration September 1981 Army Systems Acquisition Review Council August 1982 November 1981 Defense Systems Acquisition Review Council September 1982 December 1981

(U) Previous dates reflected were those anticipated in the Defense Advanced Research Projects Agency (DARPA) Assumbt Breaker milestone schedules. As the Army progressed in planning of the program, the above adjustments have been made. Should it be decided during the concept formulation to proceed with an improvement to a system already demonstrated, the Army van proceed to an ASARC II. Should it be decided to recommend alternatives which will require advanced development, the Army will proceed with an ASARC I.

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

		FY 1980	FY 1981	FY 1982	Additional To Completion	Total Est la aced Cost
	RDTE					
Ì	Funds (current requirements) Funds (as shown in FY 1980	9400	14294	11762	Continuing	Not applicable
	submission)	9200 .	7619	26126	Continuing	Not applicable

(U) Adjustments for inflation were made to the FY80 program. Congress provided the additional funds in FY81 to support a LANCE missile variant in the Assault Breaker Technology demonstration. Competing program priorities and TOA limitations precluded funding the FY 1982 total shown in the FY 1981 RDTE request.

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

UNCLASSIFIED

11-23 C1. 31 Mar 81

Program Element: #6.33.20.A

Title: Corps Support Weapon System (CSWS)

(Formerly Assault Breaker)

DUD Mission Area: #222 - Close Air Support/Battlefield Interdiction Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION:

- (U) Description: LANCE will require replacement or modification in the 1990's. The Corps Support Weapon System (CSWS) would replace LANCE and provide improved range, accuracy, survivability, and responsiveness. The CSWS is envisioned as having nuclear, conventional (possibly antiarmor), and chemical roles. A Special Task Force (STF) has been established to manage the program during concept formulation. The STF will evaluate viable alternatives (e.g., Multiple Launch Rocket System (MIRS) derivatives, LANCE missile variants, PATRIOT missile variants, ground-launched cruise missile, wheeled-versus-tracked loader launchers, etc.) to insure the system selected best meets the needs described in the Mission Element Need Statement
- (U) Mission Element Need Statement (MENS): There is a need to attack targets at ranges beyond the capability of cannons and rockets with conventional, nuclear, and chemical weapons in order to destroy, neutralize, disrupt, or delay enemy forces (mobile, stationary, fixed). By slowing down the enemy's ability to reinforce and support the central battle, friendly forces can overcome the expected unfavorable force ratio.
- 3. (U) Assault Breaker. The Under Secretary of Defense for Research and Engineering directed the Defense Advanced Research Projects Agency (DARPA) to develop emerging technologies and demonstrate the potential of a long-range unitarmor capability. The resulting DARPA technology demonstration, known as Assault Breaker, will utilize a long-range Army carrier missile with midcourse correction capabilities, an Air Force radar system to locate/track targets and provide guidance to the carrier missile and submissiles with infrared terminal homing and nonhoming target-sensing submunitions. The demonstration is to be conducted during FY81. The Army Missile Command has been directly involved as the contracting and coordinating agency for DARPA to obtain and test the carrier missiles, submissiles, and submunitions. The Assault Breaker technology will provide the baseline for any CSWS antiarmor capability and the Multiple Launch Rocket System's Terminal Guidance Warhead.
- 4. (U) Program Summary. The Army plan is to evaluate the integration of the Assault Breaker technologies, LANCE nuclear and antipersonnel/antimaterie) replacement requirements, and chemical warhead considerations together into a total CSMS program. A Special Task Force (STF) was established in 2Q81 to manage the program during concept formulation through initial ASARC/DSARC milestone. The STF will evaluate all viable atternative concept solutions (e.g., MLRS derivatives, LANCE missile variants, PATRIOT missife variants, ground-launched cruise missles, wheeled versus tracked loader launchers, etc.) to insure the system selected best meets the needs described in the MENS.

UNCLASSIFIED

11-24

of hit works Said to

Program Element: #6.33.20.A

Title: Corps Support Weapon System (CSWS)

(Formerly Assault Breaker)

DOD Mission Area: 1222 - Close Air Support/Battlefield Interdiction Budget Activity: 14 - Tactical Programs

C. (U) RELATED ACTIVITIES: The Corps Support Weapon System (CSWS) program will take advantage of ongoing Defense Advanced Research Projects Agency (DARPA) Tactical Technology Program Element (PE) 6.27.02.E; Missile Technology (PE 6.23.03.A); the Army Missile Command's Terminally Guided Submissile (TGSM) and SKEET target-cansing submunition work; the Air Force's Wide Area Antiarmor Munitions (WAAM) Program, Air Force Activity 6.46.13.F; warhead technology associated with the LANCE Missile System; Multiple Launch Rocket System (MLRS), Terminal Guidance Warhead (TGW), Program Element 6.33.03. A, Project D216; target acquisition/surveillance technology associated with the Army's Standoff Target Acquisition System; and missile looster technology associated with the LANCE and PATRIOT missile systems. The technology from the Assault Breaker demonstration will provide a baseline for any CSWS antiarmor warhead and the MLRS/TGW. Overlapping of capabilities of the above systems will be complementary in nature.

II. (U) MORK PERFORMED BY: The Army's portion (booster, dispenser, seeker/sensor, submissiles/submunitions) of the Assault Breaker technology demonstration is managed by the Army's Missile Command, Huntsville, AL. The Air Force's target acquisition/tracking/update guidance system is managed by Air Force System Command's Rome Air Development Center, Griffiss Air Force Station, MY. The following contractors are associated with the Army/DARPA Assault Breaker Demonstration: Martin Marietta Corporation, Orlando, FL, for a T-16 booster (Patriot missile variant) and submissile dispenser; Vought Corporation, Ballas, TX, for a T-22 booster (Lance missile variant) and submissiles dispenser; General Dynamics (Pomona Division), Pomona, CA, for infrared terminally guided submissiles; AVCO, Wilmington, MA, for SKEET submunition; Science Applications, Inc., Huntsville, AL, for Assault Breaker systems and test coordination.

(U) Approval of the FY 1981 funds permitted Vought Corp., Dallas, TX, to continue work on the T-22 booster (Lance missile variant) and associated dispenser. Chemical System Laboratory, Aberdeen, MD, is doing limited warhead work. Armament Research and Development Command (ARRADCOM), Picatinny Arsenal, Dover, NJ, is conducting nuclear and nonnuclear studies for the CSWs.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Awarded eight Assault Breaker Technology Demonstration contracts to develop competitive submunition, dispenser, and munitions; conducted infrared and millimeter wave seeker flight tests. Prepared Draft Mission Element Need Statement (MENS) for Corps Support Weapon System, conducted free-flight drop tests of inguided submissiles smartlets and SKEETS, conducted wind tunnel and sled tests of a submissile dispenser, provided lethality assessments of appropriately sized warheads. Awarded five Tactical Application Concept Definition Study Contracts to look at hiternative concepts. Procured and tested the T-22 booster (Lance missile variant) and associated dispenser which will be a competitor in FYBI flight tests.

UNCLASSIFIED

Program Element: #6.33.20.A

rogram Element: #6.33.20.A

Title: Corps Support Weapon System (CSWS)

(Formerly Assault Breaker)

DOD Hission Area: #222 - Close Air Support/Battlefield Interdiction Budget Activity: #4 - Tactical Programs

- 2. (U) FY 1981 Program: Flight test of an integrated Army/Air Force antiarmor system will be conducted under the DARPA technology demonstration program. Coordination for the scheduling of Standoff Target Acquisition System undate guidance demonstration will be pursued. Hajor activities will include OSD approval of the MENS and establishment of a Special Task Force (STF) to prepare a concept formulation package, cost/performance analyses, engineering estimates, system integration simulation model, Request for Proposals, and other documentation leading to a development decision.
- 3. (U) FY 1982 Planned Program: Activities of the STF will continue on the development/evaluation of concept definition packages, selection of best technical approach, preparation/completion of ASARC/DSARC, and early resolution of design/packaging issues concerning various subsystems to reduce development risk. This effort will lead either to a validation and demonstration or full-scale development phase in the FY 1982/1983 timeframe.
- 4. (U) FY 1983 Planned Program: Begin validation and demonstration or full-scale development phase, as appropriate, of the system concept that is decided upon as a result of the STF efforts.
 - 5. (U) Program to Completion: To be determined based upon results of the STF.

UNCLASSIFIED

11-26

achie Bida care to

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.35.36.A

DOD Mission Area: #213 Ground Air Defense

Title: Army Standoff Jammer Suppression
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate 6,000	Additional To Completion 30,000	Total Estimated Costs 40,000
D219	Army Standoff Jammer	0	0	4,000	6,000	90,0 00	40,000

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: A Standoff Jammer Suppression (SOJS) capability is required to defeat standoff jammers (SOJ) which
This SOJS capability will significantly enhance the capabilities of all our triendly electronic systems by destroying the large airborne SOJ's which degrade our systems.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Previous studies and analyses of proposed system configurations will be reviewed for potential application to joint Army-Navy requirements for a surface-launched weapon. Engineering design and simulation of proposed system capabilities will be initiated.

- D. (U) COMPARISON WITH FY 1981 ROTE REQUEST (\$ in thousands): Not applicable.
- E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army Funds (current requirements) Funds (as shown in FY 1981 submission)	Not Appli	(cable	o	0	1/	1/

Program Element: #6.35.36.A

DOD Mission Area: #213 Ground Air Defense

Title: Army Standoff Jammer Suppression
Budget Activity: 14 - Tactical Programs

1/ Procurement funding requirements will not be available until the first phase of the development program is completed in 1982.

11-28

in hit Michael Land 1

Program Element: #6.35.36.A DOD Mission Area: #213 Ground Air Detense Title: Army Standoff Jammer Suppression
Budget Activity: #4 - Tactical Proposes

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The requirement for a counter to the standoff jammed has been under study for several years. These studies have continued efforts to produce a viable Standoff Jammer Suppression system.
- G. (U) RELATED ACTIVITIES: The Navy portion of this program PE #63536N, Project #50854AA, will also be examining potential solutions to this task using suface-launched weapons.
- II. (0) WORK PERFORNED BY: New contracts to initiate work would be let in FY82. The US Army Ministle Command will manage the Army portion of this joint program.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 1980 and Prior Accomplishments: Not applicable.
 - 2. (U) FY 1981 Program: Not applicable.
- 3. (U) FY 1982 Planned Program: Conceptual design, initial definition of performance trade outs, and initial design will begin. Emphasis will be on specific bardware and software requirements so that detailed design and evaluation can begin. Development of system-level performance simulations will also be initiated.
- 4. (U) FY 1983 Planned Program: Continue design and evaluation of performance trade-offs. Complete detailed definition of requirements and evaluation of operational concepts. Initial testing of prototype components will also be started.
- 5. (U) Program to Completion: Identify common (Army-Navy) technological solutions to meet the requirements for a surface-launched standoff jammer suppression weapon. Complete trade-off studies to select the weapon system (new or modified existing system) best suited to perform the required mission. Complete development and testing of specific components required, and initiate procurement of required hardware and software.

FY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Blement: #6.36.74.A

DOD Mission Area: #241 - Battlefield Theater

Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: 14 - Tactical Programs

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

Project Number	TITLE TOTAL FOR PROGRAM ELEMENT QUANTIFIES	FY 1980 Actual 1677	FY 1981 Estimate 1724	FY 1982 Estimate	FY 1983 Estimat <u>e</u>	Additional to Completion Continuing	Total Failmated Cost Not Applicable
D135	Nuclear Weapon Development Support	495	560	733	843	Contlauing	Not Applicable
D148	Atomic Demolition Munition (ADM) Firing and Control System	•	216				
5153	Nuclear Effects Support Team (NEST)	673	732	979	1137	Continuing	Not Applicable
D390	Tactical Earth Penetrator (TBP)	0	0	~			
D443	Nuclear Projectiles Advanced Development	0	216			Continuing	Not Applicable
D433	Radiac Equipment Advanced Development	509	0	775	2038	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: Tactical nuclear weapons have the potential to be the deciding factor on the modern battlefield. It is thus absolutely essential for the Army to have modern, effective, and safe nuclear weapon systems. The Army must also be able to effectively defend against the effects of the enemy's nuclear weapons.

11~30

athibite and

Program Element: #6.36.04.A

DOD Mission Area: #241 - Battlefield Theater

Nuclear Warfare

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

Effective defense in a nuclear environment requires modern 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 development.

(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.

D148 - Atomic Demolition Munition (ADM) Firing and Control System - Modernization of the Army's ADM is required to

Development of a versatile, high-reliability firing and control system for fielded ADM will improve military utility and enhance safety. Current ADM's represent the technology of the garly 1960's.

(U) D153 - Nuclear Effects Support Team (NEST) - Critical Army systems must be survivable in a nuclear environment. Nuclear hardening should be applied during the development process. This program supports the transfer of a comulated system hardening technology from the Army laboratories to the system developer.

D390 - Tactical Earth Penetrator (TEP) - The development of a Tactical Earth Penetrator to must be pursued. This effort, separate and distinct from the earth penetrator effort associated with the Pershing II System (6.43.11A), will provide the Advanced Development effort required for development of a second generation TEP for delivery systems other than Pershing (e.g., the Corps Support Weapons System (CSWS)).

(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 energy in a safe and predictable way when an environment other than the intended mode firing environment is experienced. Current-generation nuclear weapons use battery power sources and shunts-to-ground.

Program Element: #6.36.0%.A

DOD Mission Area: #241 - Battlefield Theater

Nuclear Warfare

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

(U) D483 - Rudiac Equipment Advanced Development - There is an urgent requirement to develop technology to upgrade Army 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 1982 RDTE REQUEST: The Project Manager for Nuclear Munitions will continue nonsystem-related RDTE to fulfill Army-wide requirements as directed. Support of the Joint DOB-DOD Phase 2 Nuclear Weapon Feasibility Study for the Low-Altitude Air Defense System will continue. Analysis of the military requirements for ADM product improvement will be completed. If a decision is made to improve the ADM, advanced development will start in FY82. Support for various project managers in the area of nuclear survivability will be expanded as part of the Army Nuclear Survivability Program. Development of government furnished equipment will be integrated into the Army Nuclear Survivability Program. Advanced development of a quick-response, failsafe power source (turboalternator) together with associated environmental sensing devices will be initiated. Development of the Miniature Multipurpose Radiac Device (MIRD) and a radiac for employment on the remotely piloted vehicle will be initiated. Total development costs are moderate high-risk assessments because of uncertainties in the technologies involved.

	Current	MI lestone Dates
Major Milestones	Milestone Dates	Shown in FY 1980 Submission
Atomic Demolition Munition (ADM)		
Firing and Control System		
Feasibility Assessment Completed	FY8l	FY80
Initiation of Advanced Development	FY82	PY81
Factical Earth Penetrator		
Requirements Documents Completed	FY84	FY82
Feasibility Studies Completed	FY84	FY82
Advanced Development Initiated	FY85	FY83

The ADM improvement and Tactical Earth Penetrator Programs have been delayed to provide time for the Army to reevaluate the role of nuclear munitions in barrier planning.

11-32

al let boles dur fill

Program Element: #6.36.04.A

DOD Mission Area: #241 - Battlefield Theater

Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: 44 - Tactical Programs

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	1677	1724		Continuing	Not Applie able
Funds (as shown in FY 1981 submission)	1958	1852		Continuing	Not Applicable

- (U) The \$281 thousand decrease in FY80 occurred because:
- (U) DO89, the Nuclear Burst Detection System, was eliminated as a project. The user need could not be established (-\$500 thousand).
- (U) D153, Nuclear Effects Support, was increased to provide the required level of nuclear survivibility technical assistance to an expanded group of materiel developers (\pm \$180 thousand).
- (U) D443, Nuclear Projectile Advanced Development, was decremented to provide funds for higher priority Army requirements (-\$173 thousand).
- (U) 0493, Radiac Equipment Advanced Development, was increased so that Advanced Development of the digital radiac could be accelerated in 1980 (+\$212 thousand).
- (U) The \$128 thousand decrease in FY81 for the PE reflects the application of general Congressional reductions. The \$1978 thousand increase in FY82 occurs because:
 - (U) D135 is incremented to account for inflation and increased civilian pay pricing indices (+\$28 thousand).

Program Element: #6.36.94.A

DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: 44 - Tactical Programs

- (U) D148 is funded to initiate ADM product improvement (+\$411 thousand).
- (U) 0153 is incremented to account for inflation and increased civilian pay pricing indices (+45 thous.and).
- (U) D443 is funded to initiate turboalternator power sources advanced development (+\$719 thousand).
- (U) D433 is funded to initiate advanced development of the Miniature Multipurpose Radiac Device and the Remotely Piloted Vehicle Radiac (+\$775 thousand)
- E. (U) OTHER APPROPRIATION FUNDS: (\$ in thousands): Not Applicable.

11-34

of his body card of

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 intillery projectiles is to modernize stockpile weapons, develop new warhead proposals which reduce collateral damage, and improve safety, security, and command and control. Modernizing fielded nuclear weapons provides a cost-effective approach to meet changing requirements which ensue from the Army's maturing tactical warfare concepts (D18s). The reduced collateral damage efforts enhance deterrence by making the effective use of the nuclear forces more credible. Artillery applications of earth penetrator technology offer the potential for cost-effective standoff atomic demolition munitions and for attack of hirdened structures with reduced collateral damage (D390). Improved safing and arming technology facilitates operational employment of the Theater Nuclear Force while reducing the probability of an unintended nuclear detonation. The family of radiological detection, measurement, and alarm devices will be improved through application of technology developed in this program. The objective is to apply such improvements as "large-scale integration" technology to electronics in radiac equipment and to transition such improvements directly to production without further engineering development. Potential cost savings in applying this technology are substantial (0493). R6D support for nonsystem-related functions such as openail command, control, and security of the nuclear stockpile will be provided by the Project Manager (PM) for Nuclear Munitions (D175). A Nuclear Effects Support Team will provide technical support to system PM's in the area of nuclear survivability and hardening. This effort is essential because the survivability program is embryonic and requires expert lidison to firilitate technology transfer to the material developer community. This is a key element of the Army Nuclear Survivability Program (D153).
- G. (U) <u>RELATED ACTIVITIES</u>: This program complements and is closely coordinated with Department of Energy (DOE) advanced development efforts. The outputs of exploratory development efforts in PE 6.26.03.A, Large Caliber and Nuclear Technology, are utilized. Tactical Earth penetration programs under Pershing II auspices, PE 6.43.11.A, and those being accomplished by the Defense Nuclear Agency also are incorporated. Tri-Service radiological detection programs are coordinated and integrated.
- H. (U) MORK PERFORMED BY: US Army Armament Research and Development Command, Dover, NJ; Harry Discond Laboratories, Adelphi, MD; US Army Materials and Mechanics Research Center, Watertown, MA; and US Army Electronics Research and Development Command, Port Monmouth, NJ. Principal contractors include Bendix Corporation, South Bend, IN, and Soudia Laboratories, Albuquerque, NM.
- 1. (U) PROGRAM ACCOMPLISIMENTS AND FUTURE PROGRAMS:

UNCLASSIFIED

Program Element: #6.36.04.A

DOD Mission Area: #241 - Battlefield Theater

Nuclear Warfare

Title: Nuclear Munitions and Radiacs
Budget Activity: 14 - Tactical Programs

- 1. (U) FY 1980 and Prior Accomplishments: The Project Manager for nuclear munitions continued to provide assistance in identifying improvements required in the nuclear weapon stockpile, provided support to the Tri-Service Emergency Disablement Systems program, managed the nuclear warhead development effort for Pershing II, 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 continues within appropriate engineering sections of the Project Manager for Nuclear Munitions. Current efforts are focusing on technology for modern power sources and improved safety for nuclear artillery projectiles. The Nuclear Effects Support Team provided substantial support to system project advanced development completion in FY81.
- 2. (U) FY 1981 Program: The Low-Altitude Air Defense System (LOADS) Joint DOD/DOB Feasibility Study vill be initiated. Analysis in support of the Corps Supports Weapons System (CSWS) warhead concept formulation will continue. The Atomic Demolition Munition modernization study will be completed improvement options selected, and hardware development initiated. Support to Project Managers will be continued in the area of nuclear survivability. Advanced development of the digital radiac will be completed.
- 3. (U) FY 1982 Pluned Program: The Project Manager for Nuclear munitions will continue RDTE support for the LOADS and CSWS weapon systems. Development of improved safing, arming, and command and control features will continue for the ADM. Development of the quick-response turboalternator power source will be initiated. Advanced development of the Miniature Multipurpose Radiac Device (MMRD) and Remotely Piloted Vehicle (RPV) Radiac will be initiated. The Nuclear Effects Support Team will continue to support project managers in the area of nuclear survivability.
- 4. (U) FY 1983 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. AIM improved firing system development will continue. Development will continue on the enhanced safety turboaltenater power supply. The Nuclear Effects Support Team will continue to support Project Managers in the area of survivability. Nuclear weapons extended range projectile and arming and firing system improvements will be continued. Miniature Multipurpo & Radiac Device and Remotely Piloted Vehicle radiac advanced development will be continued.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

11 - 36

dilation and

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 16.36.07A

Title: Joint Service Small Arms Program (ISSAP)

DOD Mission Area: 1216 - Advanced Technology Demonstration Budget Activity: 14 - Tactical Programs

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

Project Number D640	Title TOTAL FOR PROGRAM ELEMENT Crew Served Weapon Dev.	PY 1980 Actual 700 700	FY 1981 Estimate O	PY 1982 Estimate 3600 0	FY 1983 Estimate O	Additional to Completion Continuin;	Total Estimated Cost Not Applicable
D627	Joint Service Small Arms Prog.	0	0	3600	0	Continuin,	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This effort provides a coordinated program for the advanced development of the small arms weapon systems required by the joint services to meet the threat on the battlefield of the foreseeable future. The associated technology advancement in small arms will provide a capability to respond to present and projected requirements to insure that the US fighting man will be adequately armed on the modern builtefield.
- C. (U) BASIS FOR THE FY 1982 RDTE REQUEST: Current small arms weapon systems are aging and are based on outdated technology. Increased capability must be pursued because of the high probability of a threat numerical advantage and because of continuous advances in threat equipment and continual changes in operational modes; i.e., Rapid Deployment Force, Military Operations in Built-Up Areas, armored battlefield, and improvements in personal protection. The Joint Service Small Arms Program Management Committee provides the mechanism to assure overall harmonization coordination, and control of this effort. The program facilitates consideration of diverse joint service needs, optimum utilization of limited resources (funds, facilities, and small arms expectise in government and industry), and accurate prioritization of tasks to best counter threat advances and changes in operation modes. The funds will support advanced development of six high-priority joint service items transitioning from exploratory development (6.2). These are: General Purpose Heavy Machine Gun System (both weapon and advanced ammunition to meet the modern threat), Individual Semi-Automatic Grenade Launcher, Submachine Gun, "Combat Shotgun System," Saboted Light Armor Penetrator, and Tubular Ammunition for Personal Defense Weapon and Submachine Gun.

UNCLASSIFIED

Program Element: #6.36.07A

DOD Mission Area: #216 - Advanced Technology Demonstration Budget Activity: #4 - Tactical Programs

- D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands): Not Applicable. This is the first descriptive susmary for this effort.
- E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

UNCLASSIFIED

11-38

achi boka ca chi

Program Element: 16.36.07A

DOD Mission Area: 1216 - Advanced Technology Demonstration Budget Activity: 14 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Joint Service Small Arms Program Management Committee was chartered as directed by a memorandum from the Deputy Under Secretary of Defense for Research and Engineering (Research and Advanced Technology) designating the Army as Executive Agent to establish exploratory development/nonsystem idvanced development (6.2/6.3A) program elements and program funds. The Management Committee, chaired by the Army, has a voting member from each of the Military Services (Army, Navy, Air Force, Marine Corps) and a representative of the Coast Guard (Department of Transportation). This joint service program was created to provide the means to assure that there is no duplication of effort within the Department of Defense. The basic approach is to use: Joint Service Memorandum of Agreement, Joint Service Operational Requirements, frequent meetings, and continuing liaison to assure complete interservice awareness of the total research and development program in the area of small arms and related technology, and also provide a focal point for contact with the private sector. This effort provides advanced development of enhanced performance weapon systems for small operating units and individual combatants of all services in concert with the demands of the modern and projected battlefield. Weapon eystems involved are all types of small arms to include individual and crew-served weapon systems under this project is the development of low signature weapons, improved individual fire control for effective target acquisition and engagement, application of modern lightweight/high-strength materials, high-performance light armor penetrators, and application of newly developed weapon technologies. The work contributes to modernization of this class of weapon system leading toward the immediate objectives of significant gains in individual firepower and in battlefield sustainability and survivability. Projects transitioning to 6.3A evolve from exploratory development conducted under a memorandum
- G. (U) RELATED ACTIVITIES: The technical areas in the program are related primarily to Program Siement #6.26.17.A, Fire Control and Small Caliber Armaments Technology, Project #Aill9A, Small Caliber and Fire Control Technology.
- II. (U) WORK PERFORMED BY: This program is a new start of 6.3A, Non-System Advanced Development, under the management of the Joint Service Small Arms Program. The prime in-house developing organization responsible for the program is the US Arms Armament Research and Development Command, Dover, NJ, with other major efforts at: the Naval Weapon Support Center, Crane, IN; Naval Surface Weapons Center, Dahlgren, VA; Air Porce Armament Technology Laboratory, Eglin AFB, FL.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: The result of the Squad Automatic Weapon (SAW) program under D640, Crew Served Weapon Development, not managed under the Joint Service Small Arms Program, was selection of FN MINIM1 (XM249)

UNCLASSIFIED

Program Element: #6.36.07A

DOD Mission Area: #216 - Advanced Technology Demonstration Budget Activity: #4 - Tactical Programs

manufactured by Fabrique Nationale, Herstal, Belgium (from among four competing light machine guns), as the weapon to be matured for future production. This one-man machine gun, weighing about 21 pounds with 200 rounds of ammunition, is capable of delivering sustained automatic fire to 1000-meter effective range. This weapon fires the heavy builet 5.56mm ammunition recommended for selection as the second NATO standard caliber. The combination of XM249 and heavy builet ammunition will provide a significant increase in firepower, range, and effectiveness in the rifle squad.

- 2. (U) FY 1981 Program: Not Applicable. No FY81 RDTE request was submitted.
- 3. (U) FY 1982 Planned Program: The items entering 6.3A, Advance Development, as new starts will be:

(a)(a) General Purpose Heavy Machinegun System: This caliber .50 class system provides a replacement for the current M2 and M85 weapons systems which are ineffective against modern threat targets. The new weapon is significantly lighter, has fewer parts, and is more producible at a lower cost than the M2 or M85 machine guns. It is not limited to current low impulse munitions of World War II vintage, but can utilize, through its selective dual-feed system, any combination of amounition (such as standard ball ammunition and improved penetrator rounds to defeat threat light armor at extended range). The system is planned to transition to Engineering Development (6.4) in FY84.

(b)(a)Individual Semi-Automatic Grenade Launcher: Provides substantial increase in volume of fire and hit probability over the current single-shot capability. Planned transition to Engineering Development (6.4) is FY85.

(c)(u)Submachine Gun: Replaces the current M3Al with a lighter system providing burst control, greater effective range/hit probability, and silent capability plus improved reliability and compactness. Planned transition to Engineering Development (6.4) to 8785

(d)(a)Combat Shotgun System: This multipurpose individual weapon system alternative replaces current converted commercial shotguns with a militarized system providing improved controllability, box magazine for rapid reload/increased firepower, and improved amountion for increased effectiveness over current military loads. Planned transition to Engineering Development (6.4) is FY85.

(e)(a)Saboted Light Armor Penetrator (SLAP): Provide capability against threat light armor, not available with current 7.62mm and Caliber .50 ammo, substantially improving the capability of currently fielded weapons in the near term. Planned transition to Engineering Development (6.4) is FY84.

UNCLASSIFIED

11-40

icht. Wier auf bi

Program Element: #6.36.07A Title: Joint Service Small Arms Program (JSSAP)

DOD Mission Area: #216 - Advanced Technology Demonstration Budget Activity: #4 - Tactical Programs

(f XA) Tubular Ammunition for Personal Defense Weapon and Submachine Gun: Provide capability against modern body armor, not available with current ammunition, while providing reduced impulse, increased range and higher hit probability than is currently available. Planned transition to Engineering Development (6.4) is FY84.

4. (U)(a) FY 1983 Planned Program: The items entering 6.3A, Barly Advanced Development, as new starts will be a fully integrated man/weapon Sniper Rifle System, and a modern, crew-served, automatic, high-velocity grenate launcher.

(a)Mi) The General Purpose Heavy Machine Gun System, the Saboted Light Armor Penetrator and the Tubular Ammunition for Personal Defense Weapon and Submachine Gun will transition from 6.38 to 6.38, Advanced Development.

(b)(4) The Individual Semi-Automatic Grenade Launcher, the Submachine Gun, and the Combat Shot un System programs will continue in 6.3A.

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

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.12.A DOD Mission Area: #211 - Close Combat Title: Infantry Manportable Antiarmor/Assault Weapon System (IMAAWS)
Budget Activity: #4 - Tactical Programs

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

Project Number	Tille Total for program element	FY 1980 Actual 2000	FY 1981 Estimate 19506	FY 1982 Estimate 23106	FY 1983 Additional Estimate To Completi To Be Determined	Total Estimated
D311	QUARTITIES IMAZWS	2000	19506	23106	To Be Determined	350 451466

B. BRIEF TESCRIPTION OF ELEMENT AND HISSION NEED: The Infantry must have the capability to combat numerically superior armored forces. This need has been not by the TOW, DRAGON, and LAW, respectively long-, medium-, and short-range weapons systems. This scapons mix allows the Infantry to kill tanks at long range and still afford the numbers of weapons necessary to deal with the high intensity of close combat with superior forces. The medium weapon provides the primary tank-killing firepower of light forces. The DRAGON system is deficient in

The Infantry Manportable Antiarmor/Assault Weapon System (IMANVS) will replace the DRACON system in the late 1980's. The IMAMVS will be a manportable weapon designed to correct the DRACON 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 1982 RDTE REQUEST: FY 1982 funds will continue the program begun in FY81 of competitive flight demonstrations of critical hardware components for two moderate-risk system concepts. These funds will be used for engineering design, fabrication, assembly, and test of prototypes of proposed systems. This includes testing the propulsion, warhead, launcher, and acquisition/guidance subsystems culminating in a competitive "fly-off" at the end of FY83 between the alternatives funded in this effort and the high-risk technology program (Tank Breaker) being pursued by the Defense Advanced Research Projects Agency (DARPA) in a separately funded effort.

11-42 (1, 31 Mar 81

Program Element: #6.36.12.A

DOD Mission Area: #211 - Close Combat

1

Title: Infantry Manportable Antiarmor/Assault Weapon System (INAAWS)
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Army Decision	4th Qtr 80	4th Qtr 80
Second Army Decision Review	4th Qtr 81	
Army/DOD Decision Review	lat Qtr 84	4th Qtr 82

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. The Second Army Decision Review will review concepts selected for competitive development and shoot-off at the end of FY83.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements) Funds (as shown in FY 1981	2000	19506	23106	To Be Determine	d
submission)	2000	21190	51222	393900	469312

The decrease in FY81 is attributable to the application of general Congressional reductions. The decrease in FY82 estimated funding requirements was caused by slipping the initial development effort one year and a willingness to accept greater schedule/cost risk in program planning. 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.

UNCLASSIFIED

11-43 C1, 31 Mar 81

Ahthas art

Program Element: #6.36.12.A

DOD Mission Area: #211 - Close Combat

Title: Infantry Manportable Antiarmor/Assault Weapon System (IMAAWS)
Budget Activity: 44 - Tactical Programs

- F. DETAILED BACKGROUND AND DESCRIPTION: Analyses of the current and projected threat indicate that the current infantry antiarmor systems (TOW and DRAGON) are 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 accelerated efforts to provide our infantry with adequate antiarmor firepower to combat the increasing quality of the numerically superior Soviet threat. These efforts include improving the current long-range antiarmor missile (see TOW Program Element 2.37.24.4) and developing a modium manportable system to begin replacing the current DRAGON system in the late 1980's. System concepts will be developed through flight demonstration in parallel with the Defense Advanced Research Projects Agency (DARPA) high-risk technology efforts for a focal plane array terminal homing system. Early in FY84 the most promising concept will be further advanced through engineering development to a production decision in FY87. The IMAANS will provide a manportable precision weapon to defeat armored vehicles and engage other point targets with high first-round accuracy. 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 potentially different lethality technique (e.g., top attack).
- G. (U) RELATED ACTIVITIES: TOW Missile System (PE 2.37.24.A), Advanced Munitions 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.
- II. (U) WORK PERFORMED BY: US Army Missile Command (MICOM), Redstone Arsensl, AL.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 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 vehicle-mounted system (TOW and HOT replacement), while the US would develop a manportable system (DRAGON replacement). Evaluated six IMAAWS proposals from industry and tentatively selected and contracted for the demonstration of Smart, Targit-Activated, Fire-and-Forget (STAFF), and Laser Beamrider (LBR) concepts. Subsequent information cast doubt on the systems suitability

Program Element: #6.36.12.A

DOD Mission Area: #211 - Close Combat

Title: Infantry Manportable Antiarmor/Assault Weapon System (IMANUS)
Budget Activity: #4 - Tactical Programs

(physical/performance characteristics) of the proposed demonstration hardware. The contracts were then canceled pending the results of a systems suitability study which will sufficiently define systems suitability parameters.

- 2. (U) FY 1981 Program: Continue technology development and initiate competitive system demonstrations. This will include hardware contracts for key components of maturing guidance and lethality technologies (target-sensing maniitions, laser beamrider, millimeter wave, self-forging fragment and new geometry shaped charge warheads, etc.) that could provide the required performance improvement in a manportable system. 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 1982 Planned Program: Continue competitive system concept development for validation/demonstration. Work to be accomplished in this year includes fabrication, assembly, and test of key components. Coordinate development work with NATO allies and reach agreement on a coordinated development plan for next generation antiarmor weapons.
- 4. (U) FY 1983 Planned Program: Complete competitive concept flight demonstrations. Select the best of the system concepts demonstrated in this program and the DARPA program for competitive engineering development to a production decision in FY87. Continue cooperation with NATO allies.
- 5. (U) Program to Completion: Complete development and begin production in the late 1980's for US and other NATO forces.

UNCLASSIFIED

11-45 C1, 31 Mar 81

relations and

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.36.15.A DOD Mission Area: #215 - Land Combat Support Title: Lethal Chemical Munitions Concepts
Budget Activity: 14 - Tactical Programs

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

Project <u>Number</u>	Ticle TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 1047	FY 1991 Estimate 1820	FY 1982 Estimate 8347	FY 1983 Estimate 9444	Additional to Completion Continuing	Total Estimated Cost Not Applicable
DE76	Lethal Chemical Materiel	1047	1820	8347	9444	Continuing	Not Applicable
DE77	Lethal Chemical Agent Process	0	0	0	0	0	0

- 8. (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 useable munitions is decreasing. US policy requires a chemical weapons development program which will provide a credible deterrent/retailatory 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 those needs.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Advanced development will be continued on a binary lethal agent warhead for the Multiple Launch Rocket System (MIRS). A chemical warhead for the MLRS 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 initiated on a chemical warhead for the Corps Support Weapon System and an 8-Inch Binary Intermediate Volatility Agent (IVA) Projectile. The IVA significantly increases both inhalation and percutaneous effects over the current lethal persistent nerve agents. Beginning in FY 1981, efforts on lethal chemical agent manufacturing processes will be transferred to PE 6.26.22.A, Chemical Munifilms and Chemical Combat Support, and Project DE77 will be eliminated.

UNCLASSIFIED

11-46

anhi Maka ara 19

Program Element: # 6.36.15.A

DOD Mission Area: #215 - Land Combat Support

Title: Lethal Chemical Munitions Concepts

Budget Activity: 4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
initiate Engineering Development (ED) on 155mma Binary Intermediate Volatility Agent (IVA) Projectile	Engineering Development (ED) in FY 1981	FY 1981 to enter ED
Resume AD on MLRS Lethal Binary Warhead	4Q FY 1981	1Q FY 1981
Complete AD on MLRS Lethal Binary Warhead	4Q FY 1985	2Q FY 1983
Intriate AD on 8-inch Binary IVA Projectile	40 FY 1984	Not Shown
Complete AD on 8-inch Binary IVA Projectile	4Q FY 1987	Not Shown
Initiate AD on Corps Support Weapon System	19 FY 1982	Not Shown
Complete AD on Crops Support Weapon System	4Q FY 1983	Nat Shown .

Because of close similarities in munition configuration between the type classified M687 binary 155mm projectile and the new 155mm Intermediate Volatility Agent (IVA) projectile, it is possible to move the IVA development directly from Exploratory Development (6.2) to Engineering Development (6.4). The difference in FY 1981 and FY 1982 milestones for the 155mm IVA and MLRS is due to a delay in obtaining approved requirements documents. The necessary requirement documents are scheduled for approval in FY 1981. Continued funding and progress of the entire retaliatory weapons program is dependent upon national policy pronounced by the President and supported by the Congress. Maintenance of a credible retaliatory capability requires consistent support to provide desired progress.

UNCLASSIFIED

Program Element: # 6.36.15.A

DOD Mission Area: #715 - Land Combat Support

Title: Lethal Chemical Munitions Concepts
Budget Activity: 4 - Tactical Programs

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	1047	1820	8347	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	2328	2009	2018	Continuing	Not Applicable

In FY 1980, \$600 thousand was transferred to PE 6.26.22.A, Chemical Munitions and Chemical Combat Support, to support efforts on lethal chemical agent manufacturing processes which were previously conducted under Project DE77, Lethal Chemical Agent Process. An additional \$681 thousand was reprogramed to higher priority Army requirements. The Decrease of \$189 thousand in the FY 1981 funding level reflects application of general Congressional reductions. The significant increase in FY 1982 and beyond is a reflection of the increased interest and sense of urgency in the need to develop a credible deterrent/retaliatory capability. The increased funding will support Advanced Development on new agent/munitions concepts identified as feasible and effective means of modernizing the deteriorating US chemical stockpile.

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

UNCLASSIFIED

11-48

ald toke and o

Program Element: # 6.36.15.A DOD Mission Area: #215 - Land Combat Support

Title: Lethal Chemical Munitions Concept: Budget Activity: #4 - Tactical Programs

- F. (B) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to conduct Advance to evelopment on binary lethal chemical agent munitions which have progressed from Exploratory Development and exhibit person in for expanly production through either the respiratory truct 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) <u>RELATED ACTIVITIES</u>: As directed by Department of Defense (DDD) Directive 5160.5, the Analy has executive agent responsibility for the development of all lethal chemical agents and common use munitions. Therefore, no composable 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 technical documents, Itaison officers, and by joint to dulcal coordinating groups. Exploratory work leading to this Advanced Development effort is conducted under program element (PE) 6.26.22.A, Chemical Munitions 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 wathead interface problems.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1989 and Prior Accomplishments: Numerous concepts for weaponization of lethal choice it all 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 oriteria and feasibility studies for development of a chemical warhead for the Multiple Launch Rocket System (MLRS) was the primary effort for FY 1930.

UNCLASSIFIED

Program Element: 1 6.36.15.A
DOD Mission Area: 1215 - Land Combat Support

Title: Lethal Chemical Munitions Concepts
Budget Activity: 44 - Tactical Programs

- 2. (U) FY 1981 Program: Resume Advanced Development of the binary warhead for the MLRS by preparing the Concept Demonstration Test Plan and procure material and equipment required for the test.
- 3. (U) FY 1982 Planned Program: Advanced Development (AD) on the binary watherd for the MLRS will continue. The Concept Demonstration test will be completed and evaluated. Munition and agent concepts for the Corps Support Weapon System (CSWS) and an 8-inch binary intermediate volatility agent (IVA) projectile will enter Advanced Development. Initial AD design and the Development Test I/Operational Test I (DT I/OT I) plans will be prepared. Fabrication of munitions and associated material required for the test will be initiated.
- 4. (U) FY 1983 Planned Program: The agent fill (IVA vs more persistent lethal nerve agent) for the MLRS will be selected and the validation phase of testing will be initiated. Munition fabrication will be completed and DT [/OT I will be conducted for the CSWS and 8-inch IVA projectile.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

11~50

is fall to a contract of

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.19.A DOD Mission Area: #214 - Mine Warfare Title: Landmine/Barrier Systems
Budget Activity: #4 - Tactical Programs

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

Project		FY 1980	FY 1981	FY 1982	FY 1983	Additional	Total Estimated
Number	Title	Actual	Estimate	Estimate	Estimate	to Completion	Cost
	TOTAL FOR PROGRAM ELEMENT	3981	4471	6182	8728	Continuing	Not Applicable
	QUANTITIES						Not Applicable
D005	Landmine Systems	1800	3570	4259	4403	Continuing	Not Applicable
D606	Countermine and Barrier						
	Systems	2181	901	1923	4325	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objectives of this program are to improve Army counterwine capabilities and provide for advanced development of new mine systems. Counterwine 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 counterwine 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 1982 RDTE REQUEST: Complete advanced development of a portable mine neutralization system (POMINS) to counter antipersonnel minefields and barbed wire, and a vehicle magnetic signature duplicator (VEMISIO) to counter magnetic influence fuzes. Complete advanced development of the horizontal action off-route antitank/antivel-dular mine system. Initiate advanced development of the universal mine-dispensing system and a family of improved coular shelters.

UNCLASSIFIED

Program Etement: 46.16.19.A
DOD Mission Area: #214 - Mine Warfare

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

D. (U) COMPARISON WITH FY81 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	3981	4471	6182	Continuing	Not Applicable
Funds (as shown in FY 1980 submission)	4372	6692	8723	Continuing	Not Applicable

Program decreases in FY80 and FY81 reflect restructuring within the program element and reprograming to higher priority Army programs. Reductions in FY82 are consistent with changing Army priorities and delays in advanced development of CANETIP mine neutralization system and the Cleared Lane Marking System (CLAMS).

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

UNCLASSIFIED

FT: 52

in left boder and bet

Program Element: #6.36.19.A

DOD Mission Area: #214 - Mine Warfare

Title: Landmine/Barrier Systems
Budget Activity: 44 - 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, in many instances, 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 on 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 6.36.36.4, Landmine Warfare Development, to this program element. Three mines are currently included in this category: a horizontal action off-route mine for use along roads and trails to enhance other obstacles, an improved conventional mine for hand emplacement wire, takes advantage of the features associated with the scatterable mines, and a universal mine-dispensing system Airc. will provide a mine launcher which can be used on a variety of vehicles.
- C. (U) RELATED ACTIVITIES: Component work and exploratory development for this program are conducted in Program Elements 6.27.33.A, Mobility Equipment Technology, and 6.36.06.A, Landmine Warfare/Barrier Development. Engineering development efforts which result from this program are accomplished in Program Elements 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 handtions 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 (MERAD 04), Fort Belvoir, VA, is assigned countermine and barrier development responsibility. The Development Project Officer for Selected Aumunition, US Army Armaments Research and Development Command (ARRADCOM), Dover, NJ, is assigned responsibility for landmine systems. Contractors include: Honeywell Incorporated, Hopkins, MN; Martin Martetta, Orlando, FL; Hughes Aircraft, Fullerton, CA; and Aircraft Ordnance and Manufacturing Company, Downey, CA.

UNCLASSIFIED

Program Element: #6.36.19.A

DOD Mission Area: #214 - Mine Warfare

Title: Landmine/Barrier Systems
Budget Activity: 14 - Tactical Programs

I. (U) PROGRAM ACCOMPLISIMENTS AND FUTURE PROGRAMS:

- l. (U) FY 1980 and Prior Accomplishments: 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 magnetic signature duplicator (VEMASID) to counter magnetic influence fuzes, and the horizontal action off-route antivehicular/antitank mine.
- 2. (U) FY 1981 Program: Continue Advanced Development on POMINS, VENASID, and a horizontal action off-route anti-
- 3. (U) FY 1982 Planned Program: Complete Advanced Development (AD) on POMINS, VEMASID, and a horizontal action off-route antitank antivehicular mine and continue AD on improved combat shelters. Initiate AD on the universal mine dispenser system, and develop combat shelters for other than antitank weapons.
- 4. (U) FY 1983 Planned Program: Continue Advanced Development (AD) on improved combat shelters and the universal mine dispenser system. Initiate AD on an improved Conventional Mine System (ICOMS) and a dedicated counterobstacle vehicle.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

11-54

and the second

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.27.A

DOD Mission Area: #215 - Land Combat Support

Title: Combat Support Munitions
Budget Activity: 14 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	2815	2334	6275	4029	Continuing	Not Applicable Not Applicable
DE82	Smoke Munitions and Material	2815	2334	6275	4029	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 were 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 hattlefield.
- C. (U) BASIS FOR FY 1932 RDTE REQUEST: Funds are needed to complete 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.
- D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

UNCLASSIFIED

Program Element: #6.36.27.A DOD Mission Area: #215 - Land Combat Support Title: Combat Support Munitions
Budget Activity: #4 - Tactical Programs

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	2815	2334	6275	Continuing	Not Applicable
Funds (as shown in FY 1981					
submission)	2615	2486	6956	Continuing	Not Applicable

The FY 1980 increase of \$200 thousand dollars was required to support the comparative trials of the 81mm mortar prototypes. The FY 1981 decrease reflects the application of general Congressional reductions. The \$681 thousand decrease in FY 1982 is the result of the termination of the requirement for development of a smoke projectile for the 4.2-inch mortar.

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

UNCLASSIFIED

11-56

Ber Ger grafte Michael and bei

Program Element: #6.36.27.A

DOD Mission Area: #215 - Land Combat Support

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

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: 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-area screening systems. Developmental systems will increase survivability of armored vehicles, weapons, command and control systems, and personnel.
- G. (U) <u>RELATED ACTIVITIES</u>: 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.
- B. (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 1980 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 in August 1975. As a result, interest was generated, and the smoke/acrosol 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 ntilized in the development of an improved 81mm mortar smoke cattridge. 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 procection of armored vehicles respectively. During FY 1980, competitive testing of the "Ballistic Natch" versus "Maximum Screening" prototype of the 31mm 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.
- 2. (U) FY 1981 Program: Advanced Development (AD) will continue on the manportable large-are is moke/obscurints generating system (LASS), and the infrared (IR)-defeating granade system. DT I/OT I will be completed for both systems. The 81mm mortar smoke cartridge will complete 4D and enter Engineering Development (ED).

UNCLASSIFIED

Program Element: #6.36.27.A
DOD Mission Area: #215 - Land Combat Support

Title: Combat Support Munitions
Budget Activity: 14 - Tactical Programs

- 3. (U) FY 1982 Flanned Program: Advanced Development (AD) will be completed on the manportable large-area smoke/obscurants generating system (LASS) and the IR defeating grenade. AD will be initiated on the development of an infrared-defeating smoke pot and vehicle engine exhaust smoke system (VEESS) and a family of safe training smokes.
- 4. (U) FY 1983 Planned Program: The IR-defeating VEESS will complete AD and the transfer to Engineering Development (ED). The IR-defeating smoke pot and training smokes will continue AD, and work will be initiated on an IR-defeating 155mm amoke projectile.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

11-58

and the books and a

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.28.A

DOD Mission Area: #212 - Fire Support

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

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 4581	FY 1981 Estimate 12398	FY 1982 Estimate 25190	FY 1983 Estimate 28777	Additional To Completion Continuing	Total Estimated Costs Not Applicable
D007	Field Artillery Ammunition	2997	4736	6399	11645	Continuing	Not Applicable
D276 D277	SADARM Smart Munitions	1584	7662	18791	12938 4194	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 gun 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 intillery 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 remotely set fuzes, thereby improving response and reducing human error. A major objective is the development of new fuzes 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 1982 RDTE REQUEST: To provide for: continued development of inexpensive indirect fire mortar training projectiles; continue fuze development programs; continue the gun propulsion technology program initiated in FY 1978; and continue advanced development of the Sense and Destroy Armor Munition (SADARM). An increase in FY82 funding above that projected in FY81 is required to accelerate completion of engineering development of SADARM by 1 year.

UNCLASSIFIED

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

Title: Field Artillery Ammunition Development
Budget Activity: 14 - Tactical Programs

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

	FY 1980	PY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4581	12198	25190	Continuing	Not Applicable
Funds (as shown to FY 1981					• •
submission)	5131	8053	17246	Continuing	Not Applicable

Reduction in FY30 funds reflects reprograming from project 0007 to higher priority Army requirements. Increase in FY81 is attributable to a Congressional increase to the Army request to accelerate development of SADARM. Major increase in FY82 reflect funding to accelerate the advanced development of SADARM project in D276 and the XM762 fuze in project 0007.

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

UNCLASSIFIED

H · 60

mhillion and s

Program Element: #6.36.28.A DOD Mission Area: #212 - Fire Support Title: Field Artillery Ammunition Development
Budget Activity: F4 - Tactical Programs

F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: This program supports two projects in munitions advanced development. Project D007, Field Artillery Ammunition, provides for: Development of low-cost concrete-filled plastic 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 cartrige case for advanced field artillery weapons systems, and utilization of nonmetallic rotating bands, projectile/tube interactions and cannon tube wear and erosion. A fuze development program focused on increasing the operational effectiveness of present munitions: including a high-burst artillery proximity fuze to assure capability for improved conventional munitions, extended range terminally guided projectiles and smoke and illuminating mortar/artillery applications. Advances in electronic fuze technology now offer the opportunity to realize both hand-set and remote-set capability in electronic fuzing for artillery. This program is exploiting the technology for the next generation 200-second, hand-set, electronic time artillery fuze. 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 is a carrier projectile containing three submunitions each of which is affixed to a parachute and has a sensor and lethal mechanism. Upon ejection from the artillery projectile, the parachute mechanism when a target is sensed at an appropriate range.

G. (U) RELATED ACTIVITIES: The development items in this program are directly related to exploratory research being done in Program Element 6.26.01.A, Large Caliber & Nuclear Technology. Pollow-on engineering development is conducted in Program Element 6.46.31, SADARM. Developments in this program element are compatible with US Marine Corps equirements and are coordinated to preclude duplication of effort. Prior to FY 1979, work now done under project DOO8, in program Element 6.36.29.A, Field Artillery Cannon System, was conducted in this program element. Amountain 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 636.13.A, Advanced Fuze Design, prior to FY 1981.

II. (U) <u>NORK PERFORMED BY</u>: 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 Ub 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 Ground, ND. Contractors include General Electric Company, Burlington, VT, and Syracuse, NY; Chamberlain Corporation, Waterloo IA; and Aerojet Electro Systems, Azusa, CA; Honeywell Aerospace and Defense Group, Hopkins, MN.

UNCLASSIFIED

Program Element: #6.36.28.A

DOD Mission Area: #212 - Fire Support

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

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1980 and Prior Accomplishments: The qualification of alternate explosive fill in artillery projectiles was completed in 1977, and surveillance monitoring of cilmatically conditioned munitions to establish storage characteristics 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 MIO6 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 646.28, 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 stick 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 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. Development of combustible cases for improved handling was begun. Testing of plastic rotating bands and thin-walled projectiles, and advanced development of the Sense and Destroy Armor Munition (SADARM) were initiated.
- 2. (U) FY 1981 Program: Concentrate on the design, fabrication, and evaluation of new propelling charges such as consolidated charges which permit the use of cool-burning propellant at higher loading densities and modular charges for zone simplification. Complete combustible case charge design and conduct evaluations in larger caliber cannon. Conduct high zone firings of chemically bonded plastic rotating bands. Continue development of the 200-second artillery electronic time fuzes, and high-burst artillery proximity fuzes initiated in PE 6.36.13.A, Advanced Fuze Design. Continue advanced development of the Sense and Destroy Armor Munition (SADARM).
- 3. (U) FY 1982 Planned Program: Continue development of cool-propellant, high-loading-density propelling charges and modular charges. Test combustible cartridge case configurations. Initiate development of a 4.2-inch, 1/10-range mortar training projectile and a dummy ICM/submunition training projectile. Complete AD of 200-second artillery electronic time fuze. Continue accelerated advanced development of the Sense and Destroy Armor Munition (SADARM).
- 4. (U) FY 1983 Planned Program: Advanced development of SADARM will continue through the 20FY82 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 64631. Gun Hardened, improved sensors developed in PE 6.26.03 AH-18 will

UNCLASSIFIED

11 - 62

and the second

Program Element: #6.36.28.A

DOD Mission Area: #212 - Fire Support

Title: Field Artillery Amounttion Des Japanent Budget Activity: #4 - Tactical Programs

be integrated with projectiles employing precision guidance and extended range capabilities in project D277, $Su_{a}rt$ Munitions.

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

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project D007
Program Element: 46.36.28.A
D0D Mission Area: #212 - Fire Support

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

- A. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: This project provides for: Development of concrete-fitted plastic 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, ignition, utilization of nonmetallic rotating bands, projectile/tube interactions and cannon tube wear and ero-ion; and a fuze development program focused on increasing the operational effectiveness of present munitions, including a high-burst artillery proximity fuze to assure capability for improved conventional munitions, extended range terminally guided projectiles, and for smoke and illuminating mortar/artillery applications. Advances in electronic fuze technology now offer the opportunity to realize both hand-set and remote-set capability in electronic fuzing for artillery and exploit the technology for the next generation 200-second, hand set, electronic time artillery fuze.
- B. (U) <u>RELATED ACTIVITIES</u>: The development items in this program are directly related to exploratory research being done in Program <u>Element 6.26.03.A</u>, Large Caliber & Nuclear Technology. Follow-on engineering development is conducted in Program Elements: 6.46.11, Field Artillery Ammunition, and 6.46.28.A, Indirect Fire Training Munitions. Developments in this program element are compatible with US Marline 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. (II) WORK PERFORMED BY: US Army Armament Research & Development Command (ARRADCOM), Dover, NJ; Waterviet, NY; and Aberdeen, MD; Army Material 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, ND. Contractors include General Electric Company, Burlington, VT, and Syrucuse, NY; Chamberlain Corporation, Waterloo IA.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 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 XM711, 9-Inch High Explosive (HR) 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 a minded in FY 1978 to include 60mm mortars. Fuze and spotting signatures were evaluated, low-cost packaging design

UNCLASSIFIED

! 1 64

palithetia en te

Project #D007
Program Element: #6.36.28.A
DOD Mission Area: #212 - Fire Support

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

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 6.45.23, 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 FY80 the gun propulsion program was continued with invetigations 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.

- 2. (U) FY 1981 Program: Concentrate on the design, fabrication, and evaluation of new propelling charges such as consolidated charges which permit the use of cool propellant at higher loading densities and modular charges for zone simplification. Complete combustible case charge design and conduct evaluations in larger caliber cannon. Conduct high zone firings of chemically bonded plastic rotating bands. Continue development of the 200-second artillery electronic time fuzes and high-burst artillery proximity fuzes initiated in PE 6.36.13.A, Advanced Fuze Design.
- 3. (U) FY 1982 Planned Program: Continue development of cool-propellant high-loading-density properling charges, and modular charges. Test combustible cartridge cases configurations. Initiate development of a 4.2-inch 1/10 rings mortir training projectile and a dummy ICM/submunition training projectile. Complete AD of 200-second artillery electronic time fuze, NM/62, and transition to Engineering Development in PE 6.46.31.A.
- 4. (U) FY 1983 Planned Program: Extended range propelling charge and propulsion concepts will be explored. Advanced designs in high-loading-density charges, solventiess propellants, base bleed and ramjet combustion 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 gum tube wear improvements of 100 to 200%.
 - 5. (U) Program to Completion: This is a continuing program.
 - 6. (U) Major Milestones: Not Applicable.

UNCLASSIFIED

11:65

Project #D007

Program Element: #6.30.28.A

DOD Mission Area: #212 - Fire Support

Title: Field Artillery Ammunition and Fuzes
Title: Field Artillery Ammunition Development
Budget Activity: f4 - Tactical Programs

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

RDTE	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
funds (current requirements)	2997	4736	6399	11645	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3047	5138	7972	Not Shown	Continuing	Not Applicable

Reduced FY 1980 funding reflects reprograming actions to support higher priority efforts. Decrease in FY 1981 is attributable to a general Congressional reduction. FYS2 figure reflects program restructuring.

UNCLASSIFIED

in his works care to

FY 1982 RDTE CONCRESSIONAL DESCRIPTIVE SUMMARY

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

Title: Sense and Destroy Armor (SADARM)

Title: Field Artillery Ammunition Development

Budget Activity: #4 - 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 armore assults since it has the capability to bring extensive fire power from distant standoff, protected positions. The Sense and bestroy Armor (SADARM) round will be part of the 8-inch Artillery Weapon Systems family which will provide the capability to attack assored 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-torget, near all-weather antiarmor projectile, carrying self-contained target-sensing submunitions. Using volley fire, it can attack assess 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 personnel 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 SADARM 8-inch munition in preplanned fires against hardened targets such as defense positions and assembly areas. Such targets, containing both armored and unarmored 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 torward observer to track individual targets, thus reducing forward observer exposure time. Since multiple submuniti
- B. (ii) RELATED ACTIVITIES: This project follows from exploratory development Program Element 6.70.03.A All-18 (Large caliber and nuclear technology), where a prototype subminition design was fabricated and successfully demonstrated.
- C. (U) MORK PERFORMED BY: Principal Army Management Agency is the Development Project Office for Selected Ammunition, ARRADCOM, Dover, N.J. 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, Azusa, CA, and Honeywell Defense Systems Division, Hopkins, MN.

UNCLASSIFIED

Project: #0276

Program Element: #6.36.28.A

DOD Mission Area: #212 - Fire Support

Title: Sense and Destroy Armor (SADARM)

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

D. PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (II) FY 1980 and Prior Accomplishments: Conducted conceptual design of submunition including sensor, warhead, and parachute. Procured prototype hardware and successfully demonstrated feasibility of a Sense and Destroy Armor (SADARM) submunition. Letter of Agricment (LOA) was approved, and two contracts were placed to conduct competing advanced development programs with the most successful contractor to be awarded the follow-on engineering development phase.
- 2. (U) FY 1981 Program: Contractors will complete program documentation, test, and evaluation of their respective SADARM components. Follow-on prototype hardware fabrication will be completed. In-house engineering support and contractor evaluation will be pursued.
- 3. (U) FY 1982 Planned Program: The advanced development of the Seuse and Destroy Armor (SADARM) projectile will be continued. Contractors will pursue subsystem evolution, system integration, and conduct static and ballistic testing. The design of the SADARM submunition will be completed and incorporated into the M509 shell body carrier. Full-up projectiles will be fabricated for evaluation and support of DT I/OT I. Projectiles will incorporate a dual sensor approach to minimize vulnerability to weather, battlefield dust and smoke and active and passive countermeasures.
- 4. (U) FY 1983 Planned Program: Conduct DT I/OT 1 evaluation of the competing contractor designs. Initiate procurement of long-leadline components for use during the Engineering Development (ED) phase. Conduct validation In-Process Review, select ED contractor, and initiate ED in PE 64631.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

11 68

add toke and the

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

Title: Sense and Destroy Armor (SADARM)

Title: Field Artillery Amountition Development
Budget Activity: #4 Tactical Problems

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Development Testing I	2Q FY83	None Shown
Validation In-Process		
Review	2Q FY83	None Shown
Development Testing II and Type Classification- Limited Production	2Q FY85	None Shown
Release	2Q FY85	None Shown
Development Accep tance in-Process Review and Type	·	
Classify Standard	1Q FY86	None Shown
Pull-Scale Production	4Q FY86	None Shown

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

OUT	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Est imated Cost
Funds (current requirements) Funds (as shown in FY 1981	1584	7662	18791	12938	33226*	. 41 ∪0#
submission)	2084	2915	9274	None Shown	Continuing	hot applicable

^{*}Includes Engineering Development in PE #6.46.31.A, Project D369. Total estimated costs are based on a preliminary baseline cost estimate only. FY80 funds reprogrammed to other Army requirements. Increases in FY81 and 82 reflect Congressional and OSD acceleration of the program.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.36.29.A

DOD Mission Area: #212 - Fire Support

Title: Field Artillery Cannon Systems
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 3646	FY 1991 Estimate 5862	FY 1982 Estimate 2074	FY 1983 Estimate 15556	Additional to Completion Continuing	Total Estimated Cost Not Applicable
p008	Division Support Weapon System	3646	5862	2074	15556	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Heavy Brigade/Division Field Artillery Fire Support Weapon System provides indirect fire support to the maneuver forces of Armored and Mechanized Divisions/Brigades. Indirect fire Support provided by this system includes the destruction, neutralization, and suppression of target elements within the maneuver commander's area of responsibility. The purpose of the Heavy Brigade/Division Program is to ensure that the US Army maintains a responsive, survivable, and lethal Heavy Brigade/Division System through improvement of the currently fielded system, development of a new system, adaptation of a foreign system or components, or a combination of these approaches as required.
- C. (II) BASIS FOR THE FY 1982 RDTE REQUEST: FY 1982 funds are required to support the concept formulation phase of the Heavy Brigade/Division Fire Support Weapon System Program. The Heavy Brigade/Division Field Attillery Fire Support Mission Element Need Statement has been approved by the Secretary of Defense. A Special Task Force (STF) will be formed in 1981. The Special Task Force will manage the program during the concept formulation phase and will evaluate alternative system concepts. Results of Concept Generation Contracts executed in FY 1980 indicated that additional in-depth analyses in specific pressures must be initiated in 1981 to include terminally guided munitions; command, communications, and control; and ammunition packaging and resupply. Detailed preparation for 30FY1982 Army Systems Acquisition Review Council Decision will also be initiated in FY 1981. The FY 1982 funds are required to complete the work initiated in FY 1981.

UNCLASSIFIED

11-70

ashibitation to

Program Element: #6.36.29.A

DOD Mission Area: #212 - Fire Support

Title: Field Artillery Cannon Systems

Budget Activity: 14 - Tactical Programs

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

	FY 1980	PY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements) Funds (as shown in FY 1981	3646	5862	2074	Continuing	Not Applicable
submission)	2269	6175	19117	Continuing	Not Applicable

The change in PY 1980 funding was due to an increase of \$400 thousand to complete the 109/M203 propell at charge program, and an increase of \$977 thousand for the Heavy Brigade/Division Field Artillery Weapons System Program. The decrease in PY 1981 funding is due to a reprograming to a higher priority Army requirement. The difference in the PY 1932 figures is because of funding constraints due to higher Army priorities that prevented the Heavy Brigade/Division Field Artillery Weapons System Program from entering Advanced Development in PY 1982 as was originally planned.

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

UNCLASSIFIED

Program Element: #6.36.29.A DOD Mission Area: #212 - Fire Support Title: Field Artillery Cannon Systems
Budget Activity: #4 - Tactical Programs

(B) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to determine, and then develop, the optimum approach for a responsive, lethal, and survivable Field Artillery System to provide indirect fire support to the Heavy Fire Support System has been approved by the Secretary Secretary of Defense. A Letter of Instruction is being prepared by the Office of the Deputy Chief of Staff for Operations and Plans that directs formation of a Special Task Force to consider alternative approaches for satisfying the stated need. Apparent alternatives include cannon, rocket, or missile solutions. Preparation for a comprehensive analysis and evaluation of alternative system approaches by the Special Task Force, leading to a 3d Quarter FY1982 decision by the Army Systems Acquisition Review Council, has been initiated. In FY 1979, FY 1980, and 19FY 1981, the Army conducted a detailed assessment of technology available to improve the Heavy Brigade/Division Field Artillery Fire Support Weapon System. During this time system concepts implementing the available technologies were generated and evaluated. Specific areas such as terminally guided munitions; communications, control; and ammunition packuging and resupply that require more detailed analysis have been identified; these analyses will be conducted during FY 1981 and FY 1992 and the results provided to the special task force. The technology survey and concept generation effort was executed with extensive participation by industry. Two industrial teams, headed by PMC Corporation and Pacific Car and Foundry Corporation, generated concepts for new cannon systems. A third industrial team headed by Norden Systems conducted a comprehensive evaluation of the M109 155mm Cannon System and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon System and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon System and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon Systems and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon Systems and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon Systems and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon Systems and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon Systems and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon Systems and has developed concepts and proposals for improvements to be approximately the context of the M109 155mm Cannon Systems and the M109 155mm Cannon Systems are context of the M109 155mm Cannon Systems and the M109 155mm Cannon Systems are context of the M109 155mm Cannon Systems and the M109 155mm Cannon Systems are context of the M109 155mm Cannon Systems and the M109 155mm Cannon Systems are context of the M109 155mm Cannon S lied to thit system. A government team submitted a concept for a modified Multiple Launch Rocket System that will be considered as an alternative by the Special Task Force. A government team also solicited, compiled, and evaluated information on foreign systems and components that would contribute to solving the deficiencies in the H109A2/A3 system. The technology survey and system concept generation effort was completed by a General Officer's Review, during which decisions were made as to the completeness and quality of work accomplished and additional work that is required to support a Special Task Force.

G. (U) RELATED ACTIVITIES: The projects in this program are related to Program Elements 6.26.03.A, Large Caliber and Nuclear Technology, where weapons exploratory work is performed; 6.27.02.E Tactical Technology, where the Defense Advanced Research Projects Agency is investigating extended range ammunition and advanced seeker technology; 6.36.28.A, Improved Conventional Ammunition, where Field Artillery Ammunition Development is accomplished; 6.33.06.A Dual Mode Seeker, where new seeker technology with potential application to Artillery Systems is being investigated; 6.36.21.A, Combat Vehicle Engine, where Combat Vehicle Propulsion Systems are being investigated; 6.37.07A Army Data Distribution System; 6.46.21.A, Copperhead, now entering production; 6.46.03A, Improved 155mm Nuclear Projectile, where engineering development of an Improved 155mm Nuclear Projectile is underway; 6.51.1MForeign Weapons Evaluation, where evaluation of foreign weapon systems is conducted; 6.47.27A, Division Artillery and Battalion Fire Direction Centers; 6.46.31.A, Ammunition 155mm, where field artillery ammunition engineering efforts are being pursued. Activities of related programs will be monitored, and reviews will be conducted to preclude duplication of efforts.

UNCLASSIFIED

11-72

as had stroken as a con-

Program Element: #6.36.29.A DOD Mission Area: #212 - Fire Support Title: Field Artillery Cannon Systems
Budget Activity: #4 - Tactical Programs

II. (U) MORK PERFORMED BY: Contracts for system concept studies were executed by Food, Machinery and Chemical Gorp (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 Dovelopment Command (ARRADCOM), Dover, NJ, Edgewood, MD, Aberdeen, MD, and Watervilet, NY; Army Materiel Systems Analysis Agency (AMSAA), Aberdeen, MD; Defense Advanced Research Projects Agency (DARPA), Arlington, VA; US Army Test and Evaluation Command (TECOM), Aberdeen MD: US Army Operational Test an Evaluation Agency (OTEA), Fails Church, VA; US Army Field Artillery Board (USAFAB), Ft Sill, OK; US Army Training and Doctrine Command (TRADOC), Ft Monroe, VA; US Army Tank Automotive Research and Development Command (TARDCOM), Warren, MI; US Army Armament Hiteriel Rendiness Command (ARRCOM), Rock Island, IL; US Army Communications Research and Development Command, Ft Monmonth, NJ; US Army 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 PUTURE PROGRAMS:

- 1. (U) FY 1980 and Prior Accomplishments: From FY 1976 to FY 1979, the bulk of this program funding was used to determine the feasibility of using the M203 propelling charge to provide an extended range capability for the M109 series 155mm Self-Propelled Howltzers. Although analysis and testing have shown that the range of the M109 can be increased using the M203 propelling charge, the adverse impact of higher overpressure on personnel and the degradation of reliability of the howltzer led to a decision that the M203 will not be type classified for use in the M109. Funding was also provided through 1979 to support updating of the Field Artillery Digital Automatic Computer software in consonance with the fielding of new weapons and munitions. In FY 1979, a Request for Proposal was issued and proposals from 7 prime contractors were evaluated for system concept studies of an enhanced 155mm Self-Propelled (SP) Artillery Meapon System. Contracts were awarded to PMC Corporation and Pacific Car and Foundry Corporation to survey technology and generate concepts for a new system-that could be fielded in the 1990-2010 timeframe. A contract was also awarded to Norden Systems to determine improvements that could be made to maintain or increase the capabilities of the currently fielded M109AZ/A3 system. The information gained from these contracts was evaluated by a government team in the fall of 1980 and the results presented to a General Officer's Review in December 1980.
- 2. (U) PY 1981 Program: The concept generation contracts awarded during the first quarter of FY 1980 were completed during the first quarter of FY 1981. The results were presented to a General Officer's Review by a government evaluation team, with the conclusion that dramatic increases in Heavy Brigade/Division System capabilities can be achieved. The areas of Command, Communications, Control, Operation in Nuclear Biological, Chemical Environment; handling, pickaging, and ammunition and resupply were determined to require more in-depth analyses. These analyses are to be initiated in

UNCLASSIFIED

Program Element: 16.36,29.A
DOD Mission Area: 1217 - Fire Support

Title: Field Artillery Cannon Systems
Budget Activity: 14 - Tactical Programs

20FY 1981. A letter of instruction for formation of a Special Task Force that will evaluate alternative concepts is being drafted. Administrative preparation for an Army Systems Acquisition Review Council Decision has been initiated.

-). (9) FY1982 Planned Program: The work in FY 1982 will be to complete the work initiated in FY 1981. Final preparations for 3QFY 1982 Army Systems Acquisition Review Council Decision will be completed. Preparation for entering Advanced Development during 1QFY1983 will be completed.
- 4. (U) FY 1983 Planned Program: A competitive Advanced Development Phase is planned to be initiated in 19FY 1983 should the decision be made to develop a new system.
- 5. (U) Program to Completion: Should the decision be made to develop a new system, the program is projected to enter Engineering Development in 20FY 1986. The Production Decision is planned for 10FY 1990 with the initial fielding being planned for 40FY 1990.

UNCLASSIFIED

11-74

ridal teritoria (p. 18

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #5.36.32.A

DOD Mission Ares: #216 - Land Combat Service Support

Title: Armored Combat Support Vehicle Finally
Budget Activity: #4 - Tactical Programs

A. (9) RESOURCES (PROJECT LISTING): (\$ in thousands)

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 3700	FY 1981 Estimate 3224	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion 13931	Total Estimated Cost 20958 Not Applicable
D154	Armored Forward Area Rearm Vehicle	1000	600	-	-	13931	15531
DLO9	Field Artillery Ammunition Support Vehicle	2700	2624	103	-	-	5127

(U) NOTE: D154 (Armored Combat Support Vehicle Family) project is changed to the Armored Potward and Rearm Vehicle as shown above. Prior to FY82, the Armored Combat 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 Haldtenance Assist Vehicle and Medical Evacuation Vehicle listed under the D154 project in FY81 used no funds and will not be listed under the D154 project in the future. They are not funded in FY82.

- B) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Supports Army needs for armored combat support vehicles to meet two till 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 protection for ammunition thereby allowing them to remain in the main battle area where they are needed a much larger percent of the time to supply combat vehicles in or near their fighting positions.
- 2. (U) Field Artillery Ammunition Support Vehicle (FAASV): Provides protection of artillery ammunition during resupply of self-propelled artillery weapons in their firing positions, that are subject to counterbattery first from enemy tocket and cannon. This vehicle will replace the unprotected MS48 tracked resupply vehicle, and provide armore i protection for the

UNCLASSIFIED

Program Element: \$6.36.32.4DOD Hission Area: \$216 - Land Combat Service Support

Title: Armored Combat Support Vehicle Family Budget Activity: #4 - Tactical Programs

ammunition and crew. The vehicle will have new ammunition-handling equipment permitting faster and less man-intensive ammunition resupply.

C. (U) BASIS FOR FY 1082 RDTE REQUEST:

1. (U) The Armored Forward Area Rearm Vehicle (D154) is unfunded in FY82. This will result in at least a one-year

2. (U) The Field Artillery Ammunition Support Vehicle completes its development program in FY82. The Army will procure five Field Artillery Ammunition Support Vehicle prototypes for an FY92 Operational Development Test II evaluation to determine their sultability for artillery ammunition support for armoved and mechanized divisions or separate brigades. These prototypes will be produced using the M109 self-propelled 155mm howitzer chassis.

3. (B) As stated in paragraph Cl above, there is no FYS2 funding to continue the Armored Forward Area Rearm Vehicle project. The Field Artillery Ammunition Support Vehicle project is funded for development which will be completed in FYS2. Funding level for the Field Artillery Ammunition Support Vehicle program is considered adequate and valid by the Army. This project is considered a low-risk effort since the chassis (MIO9) has been in use by the field artillery for fifteen years.

Milestone Dates Current Major Milestones Shown in FY 1981 Submission Milestone Dites Armored Forward Area Rearm Vehicle
Award Testbed Contract: 2QFY1980 40FY1980 Delay was caused by late release of funds to the project. 20PY1981 10PY1991 Conduct Operational Evaluation: of late FY80 start of project. Delay was a result Award Engineering Development Contract: Program not funded2QFY1981 There will be a one year project delay due to a lack of funds. 40FY1982 Complete Operational Testing: 10FY1982 Type Classify: Field Artillery Ammunition Support Vehicle:

40FY1980 20FY1980 Release Request for Proposal:

UNCLASSIFIED

11 76

ald was and

Program Element: #6.36.32.A DOD Mission Area: #216 - Land Combat Service Support

Title: Armored Combat Support Vehicle Family
Budget Activity: 04 - Tactical Programs

Mijor Milestones Armored Forward Area Rearm Vehicle

Current Milestone Dates

Milestone Dates Shown in FY 1981 Submission

Delay was caused by late release of funds in FY80 to this project. 20FY1981 30FY1980 Armored Contract: Same as Above 3QFY1982 3QFY1981 Complete Operational Testing: Same as above 4QFY1982 Type Classify:

Same as above

4QFY1981

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

	FY 1980	FY 1981	FY 1982	Additional to Completion	Total Estimated Cost
RDTE Funds (current requirements)	3700	3224	103	13931	20958
Funds (as shown in FY 1981 submission)	4400	3516	1513	20000	29429

The Armored Combat Support Vehicle Family project is an outgrowth of the Program Element 5.36.24A/D154, Vehicle Rearm System Project. Differences reflect a restructuring of the project. The FY 1980 decrease of \$700K was caused by these funds being used by the Army for a classified project. The reduction of \$1410K in FY 1982 was caused by the Armored Forward Area Rearm Vehicle project not being funded. The decrease in additional to completion funds was caused by the Maintenance Assist Vehicle and Medical Evacuation Vehicle being removed from this project.

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

UNCLASSIFIED

DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/6 5/1 DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT TEST & EVALUA--ETC(U) AD-A101 306 JAN 81 UNCLASSIFIED ML. 2 0 € 6

Program Element: #6.36.32.4

DOD Mission Area: #216 - Land Combat Service Support

Title: Armored Combat Support Vehicle Family
Budget Activity: 14 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: In order to win in ground combat against enemy mechanized forces which are numerically superior, US tanks, artillery, and other fighting vehicles must sustain combat at higher intensities for longer periods than ever before. Frontline logistical support becomes the buttress of sustaining these combat operations. Vehicles required for this support must have protection against small arms and overhead artillery fires and cross-country mobility comparable to the tracked combat vehicles they support. Resupply of tank, infantry fighting vehicle, and artillery ammunition to the combat site for on-position resupply is essential to satisfying the increased logistical demand. There are two current combat systems which demand increased logistical capabilities. A priority development is an armored resupply vehicle designed specifically to resupply tanks and infantry fighting vehicles. A priority development is an armored resupply vehicle area. The other priority development is a Field Artillery Ammunition Support Vehicle designed to couple with self-propelled howitzers for sustained firing engagements in a counterbattery environment. The Army initiated the development of these two priority programs in FY 1980. There is no intent in this program to develop a new tracked combat vehicle. The Armored Forward Area Rearm Vehicle program will develop an armored module in which to carry tank and infantry-type ammunition, and attendant on-board material handling equipment. It will use the Multiple Launch Rocket System (MERS) chassis as the basic carrier, thus providing cross-country mobility and protection from small arms and splintering munitions. The M102 chassis (field Artillery Ammunition Support Vehicle) is desired by the user as the carrier for field artillery ammunitions. The M102 chassis is the basic system for the M109A1/A2/A3, 155mm howitzer weapon system now organic to all armore and mechanized infantry artillery units. Using this chassis, the Field Artillery Ammunition Support
- G. (U) RELATED ACTIVITIES: This program is related to all of the Army's research and development programs connected with tactical and special purpose vehicles. Programs of primary interest are: Program Element (PE) 6.26.91.4, Tank and Automotive Technology; PE 6.11.02.A, Project AF22, Research in Vehicle Hobility; PE 6.21.05.A. Miteriels; PE 6.36.21.A, Combat Vehicle Propulsion System Development; and PE 6.33.03A, Project 216, GSRS. Duplication of effort is avoided by review and coordination of programs at Headquarters, Tank Automotive Command.
- II. (U) WORK PERFORMED BY: US Army Tank and Automotive Command, Marren, MI, has the responsibility for implementation of this program. Contractors for the Field Artillery Ammunition Support Vehicle will be selected in FY 1981.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1989 and Prior Accomplishments: An engineering evaluation was conducted on several configurations of amounttion-carrying modules and amounttion material-handling equipment to support the development of the Armored Forward Area

UNCLASSIFIED

11-78

mbiliting and the

. . .

Program Element: #6.36.32.A

DOD Mission Area: #216 - Land Combat Service Support

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

Rearm Vehicle and the Field Artillery Ammunition Support Vehicle. A contract was awarded to develop an ammunition module for the Armored Forward Area Rearm Vehicle. A request for proposal was made to produce five Field Artillery Ammunition Support Vehicles. An Army decision was made to reevaluate the requirements for the Maintenance Assist Vehicle and the Medical Evacuation Vehicle.

- 2. (U) FY 1981 Program: The Armor Center will evaluate one technology demonstrator module to support the Armored Forward Area Rearm Vehicle project using an MLRS chassis. The Army will contract for five prototype Field Artiflery Ammunition Support Vehicles to be used for operational and developmental testing in FY82.
- 3. (U) FY 1982 Planned Program: There is no planned FY 1982 Armored Forward Area Rearm Vehicle program. It is anticipated that this program will be continued in the future, once the Army clarifies the requirement and the concept. Complete development of the five prototype Field Artillery Ammunition Support Vehicles and conduct operational and developmental testing. Type classify this support vehicle to allow production in FY 1983.
 - 4. (U) FY 1983 Planned Program: Prepare for procurement of the Field Artillery Amountation Support Vehicle.
- 5. (U) Program to Completion: Begin procurement of 1293 Field Artillery Ammunition Support Vehicles to fill a critical need in Europe. Begin engineering development of an Armored Forward Area Rearm Vehicle when funded. Complete operational and developmental testing and type classify this system to allow future procurement.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6,36.35.A DOD Mission Area: #211 - Close Combat Title: Advanced Multi-Purpose Armament System
Budget Activity: #4 - Tactical Programs

THIS DESCRIPTIVE SUMMARY WILL BE SUBMITTED UNDER A SEPARATE COVER.

UNCLASSIFIED

11-80

white was a second

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.95.A

DOD Mission Area: #216 - Land Combat Service Support

Title: Physical Security
Budget Activity: 14 - Tactical Programs

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

Project		FY 1980	FY 1981	FY 1982	FY 1983	Additional	Total Estimated
Number	Title TOTAL FOR PROGRAM ELEMENT	* Actual 3375	Estimate 3100	Estimate 3887	Estimate 5556	To Completion	Costs Not Applicable
DK82	Physical Security	3375	3100	3887	5556	Continuing	Not Applicable

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, and the rear area of deployed forces. The need is to use physical security equipment to enhance all DOD security to the maximum extent possible and decrease manpower (guard) requirements to a minumum.

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

1. (U) Funds are required to accomplish advanced development of: (1) components to provide additional capabilities for the Facility Intrusion Detection System (FIDS) in full-scale development under Program Blement 6.47.18.A, Physical Security, (2) exterior lighting and barrier systems, and (3) security locks and containers. Advanced development will continue on the following FIDS components: Adaptive and discriminative strain and radio frequency (RI) motion sensor; fiber optic, RF, and extended range data links; and the fog-deterrent response device. Advanced development will be initiated for a low-light-level TV suitable for FIDS, and a strain-sensitive cable for use as a combination sensor and data link. Advanced development of optimized security lighting and barrier systems will continue, and a validation In-Process Review (IPR) will be conducted for the lighting and barrier components that will satisfy the DOD security requirements. Advanced development will be initiated for security locks and containers.

2. (U) PIDS development costs have been validated in the PIDS Baseline Cost Estimate (BCE). Validation IPR for both the Security Lighting and Barrier Systems and the contrasting Ground Cover System has been delayed because of a delay in having an approved requirements document. The Military Police School has drafted a Letter of Agreement (LOA) which was forwarded to Headquirters, Training and Doctrine Command (TRADOC), and to the other services for stiffing on 1 December 1980. TRADOC approval is anticipated 2081.

UNCLASSIFIED

Program Element: #6.37.05.A

DOD Mission Area: #216 - Land Combat Service Support

Title: Physical Security
Budget Activity: 4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission		
Special IPR - Electronic Altering System	2Q81	Not Shown		
VAL-IPR - Security Lighting & Birrier Systems (Originally Group I Components)	2082*	1 (281		
VAL-1PR-Advanced FIDS Group II	4081	4081		
VAL-IPR-Security Locks and Containers	FY83**	FY82		
VAL-FPR-Contrasting Ground Cover System (Originally Group II Lighting and Barrier Components)	FY83*	PY82		
VAL-IPR-Advanced FIDS Group III	PY93	PY83		

- * Validation IPR has been delayed pending approval of requirements document.
- ** Villition IPR has been delayed because available Military Police School manpower resources have been devoted to the priority FIDS and Lighting and Barrier Systems.
- D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

UNCLASSIFIED

11-82

and the state of t

Program Element: #6.37.05.A DOD Mission Area: #216 - Land Combat Service Support Title: Physical Security
Budget Activity: 44 - Tactical Programs

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1981	3375	3100	3887	Continuing	Not Applicable
submission)	3500	3281	5817	Continuing	Not Applicable

In FY80 the \$125K was reprogramed to 6.47.18.A to fund a cost growth on the interim FIDS contract. Decrease in FY81 is attributable to the application of general Congressional reductions. Reduction in FY82 is due to total obligational authority constraint.

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

UNCLASSIFIED

Program Element: #6.37.05.A DOD Mission Area: #216 - Land Combat Service Support Title: Physical Security
Budget Activity: #4 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: 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. Development will include the following: (1) sensors, including penetration, motion, item removal, duress, and contraband; (2) electronic data links, data link security supervisory components, and contralized 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; and (8) exterior lighting and barrier systems. Interfaces necessary to integrate exterior sensors developed by the Air Force and potential shipboard security equipment components adopted by the Navy will also be developed in consonance with the direction from the Under Secretary of Defense (Research and Engineering) (Memo of 26 July 1979) for the Army to "develop the command, control, and display 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 land based systems." In addition, there will be a continuing evaluation of commercial physical security equipment as well as those items that might be developed by other government agencies.
- G. (U) RELATED ACTIVITIES: The exploratory development for physical security equipment is conducted under PE 6.27.31.A, project AI29, Mobility Equipment Technology. The improved processing technique effort and the fiber optic data link, which entered advanced development in FY80, 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 (BISS) exterior physical security program. Close coordination with REMBASS, BISS, and the Navy is being accomplished to assure utilization of related technologies and developments and to prevent duplication of effort. Coordination is accomplished by joint working groups and attendance at other Service and department meetings. The DOD Physical Security Equipment Action Group monitors and coordinates the development and acquasition of physical security equipment (POPSE), who monitors and coordinates the development, acquisition, integrated logistic support, and installation of physical security systems.
- H. (U) WORK PERFORMED BY: The 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 GTE Sylvania, Mountainview, CA; Southwest Research, San Antonio, TX; General Instruments Corporation, Hicksville, NY; Tetra Tech, Incorporated, Pasadena, CA; and ENSCO Incorporated, Springfield, VA.

UNCLASSIFIED

11-84

as had blooked and a

Program Element: #6.37.05.A DOD Mission Area: #216 - Land Combat Service Support Title: Physical Security
Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments:

- a. (U) Facility Intrusion Detection System: Advanced development in pursuance of the approved Materiei Need for the Facility Intrusion Detection System (FIDS) was initiated during FY 1974 under Program Element (Pi) 6.37.19.A, Special Purpose Detectors. During FY19 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 RF Data Link. AD was initiated for a strain sensor, the RF motion sensor, improved signal-processing techniques, a combination light and sound response device and secure fiber optic links.
- 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 righting and barriers task was begun, and points of contact for lighting were established at the Defense Nuclear Agency (00A), National Bureau of Standards (NBS), Energy Resources Defense Administration (ERDA), Base and Installation Security System Project Office (BISSPO), and Sandia Laboratories. In FY79 contracts were awarded for fence components, luminaires, triller-mounted light towers, lighting control system, a lighting and barrier composite system analysis program, models of a 4 high-pressure sofium 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 the probability of making a correct target assessment. Personnel barriers were constructed and evaluated to determine their delay and diterrent characteristics. Contrasting ground covers were installed and evaluated in terms of Improving the sentry's tar, et assessment.
- c. (U) Electronic Alerting System: A contract was awarded in FY79 to initiate development of an Electronic Alerting System (EAS) for use in certain installations in Europe. The EAS is to alert local security forces and, through existing organic communication systems, alert higher headquarters.

2. (U) FY 1981 Program:

a. (U) Facility Intrusion Detection System: The development of adaptive and discriminative sensors, improved processing and decision logic will continue under contract. In-house effort will be required to prepare, award, and monitor the contract and evaluate the improved processing techniques. Advanced development of Secure Fiber Optic Data and

UNCLASSIFIED

Program Element: #6.37.05.A

DOD Mission Area: #216 - Land Combat Service Support

Title: Physical Security
Budget Activity: 44 - Tactical Programs

Surveillance Links will be continued. In-house evaluation of a secure internal surveillance link, a strain sensor which will detect the removal of a protected item and structural stress changes within a protected area caused by the movement of an intruder, an extended range internal data transmission system, and the Advanced Development Models of the RF Motion Sensor and the combination Light and Sound Response Device procured in FY30 will be initiated. A contract will be awarded for Advanced Development Models of Fog-Deterrent Response Devices. A Validation In-Process Review (IPR) will be convened for the Advanced FIDS Group II components.

- b. (U) Security Lighting and Barriers System: The contractual effort for testing lighting systems to determine the quantity of illumination and illumination distribution will continue. Personnel barriers will be developed and evaluated to determine their effectiveness in delaying and deterring intruders. The physiological and psychological effects of the lighting and barrier components on both the sentry and the intruder will be evaluated. The MERADCOM in-house effort will be directed towards contract preparation, award, and monitoring; providing assistance in the generation of a Required Operational Capability (ROC) for lighting and barriers; and revising the lighting and barriers Acquisition Plan.
- c. (U) Electronic Alerting System: A Special In-Process Review (SIPR) will be conducted to present the results of in-house testing, formalize the quantitative requirements, and obtain approval of the planned approach. If the SIPR approves the approach, a contract will be awarded for test hardware for evaluation in Europe in PY82.

3. (U) FY 1982 Planned Program:

- a. (U) Facility Intrusion Detection System: Advance development contracts for the Adaptive/Discriminative Sensor and the Fiber Optic Links will be modified and development continued in FY82. In-house effort will consist of providing technical guidance to the contractor and completion of the evaluations initiated in FY81. The evaluations of the Strain Sensor, the RF Motion Sensor, the Combination Light and Sound Response Device, and the Secure Internal Surveillance Link initiated in FY81 will be completed, and any changes required will be incorporated in the equipment. Advanced Development Models of the Extended Range Internal Data Transmission System will be delivered and an evaluation initiated. Advanced Development of the RF Data Link will be continued and Advanced Development of an Low-Light-Level TV suitable for FIDS will be initiated. The Advanced Development models of the Fog-Deterrent Response Devices contracted for in FY81 will be delivered, and both types of fog deterrents will be installed in a magazine and undergo test and evaluation. An investigation of a strilm-sensitive cable for use as a combination Sensor and Secure Data Link will be initiated.
- b. (U) Security Lighting and Barriers Systems: Advanced Development Validation Tests will be completed, and a Validation IPR will be conducted in the 2Q for the lighting and barrier components that will satisfy the DOD security requirements.

 UNCLASSIFIED

11-86

old Baker and

Program Element: #6.37.05.A DOD Mission Area: #216 - Land Combat Service Support Title: Physical Security
Budget Activity: 14 - Tactical Programs

c. (U) Security Locks and Containers: Advanced Development of high-security locking systems for nuclear and chemical storage magazines will be initiated.

4. (U) FY 1983 Planned Program:

- a. (U) Facility Intrusion Detection System: A Validation In-Process Review will be conducted for the Strain Sensor, RF Data Link, and selected Rear Area Security Devices. Advanced Development of Transit Security, Rear Area Security Devices, Fiber Optic Security Links, Response Devices, Low-Light-Level TV, Adaptive and Discriminative Sensor, Strain-Sensitive Cable, and the Extended Range Internal Data Link will continue. Advanced Development of new transducers and smart sensors will be initiated. New threat information will be generated and evaluated to identity any system or equipment deficiencies.
- b. (U) Security Locks and Containers: The Security Locks and Containers Program will continue with the following potential programs: (1) Development of a lock that is an integrated part of an Intrusion Detection System, and (2) the development of a one-time key that may be a combination of an identification (ID) badge and key, using electrically programed solid state read-only memory.
- 5. (U) <u>Program to Completion</u>: This is a continuing program. In FY84 and the outyears, there will be a continuing effort to develop physical security hardware which is capable of countering the ever-increasing sophistication of the threat to military personnel and property. Coordinated efforts with the other services will be directed towards integrating components/subsystems/systems developed under this Program Element into a completely integrated interior/exterior physical security system for the Department of Defense.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: # 6.37.06.A

DOD Mission Area: #254 - Tactical Command & Control

Title: Identification Friend-or-Foc (IFF) Developments
Budget Activity: #4 - Tactical Programs

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

Project		FY 1980	FY 1981	FY 1982	FY 1983	Additional	Total Estimated
Number	Title	Actual	Estimate	Estimate	Estimate	To Completion	Costs
	TOTAL FOR PROGRAM ELEMENT	4045	402	9496	4143	Continuing	Not Applicable
D243	1FF Developments	350	402	3595	4143	Continuing	Not Applicable
D297	IFF NATO	3695	0	5901	0	Continuing	Not Applicable

- B. (U) BRIFF 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 sircraft 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 (SOTAS, 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 (), 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 for MK () IFF NATO for FY83 are currently being identified.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Under IFF Developments (D243), complete test and evaluation of a noncooperative IFF signal processor for Hawk, and award a contract for a design study to apply the same technique to Patriot; begin development of noncooperative IFF techniques to identify ground combat vehicles. Start Tri-Service Hark XII Technical Improvement Program (TIP). Under NATO IFF program (D297), complete system specification for the air defense applications and award a contract for advanced development; complete requirements study for battlefield applications, as well as system definition.

UNCLASSIFIED

11-88 C1, 31 Mar 81

Program Element: # 6.37 Ob.A

DOD Mission Area: #254 - 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 1980 Submission
Test NCIFF (noncooperative IFF) for I	lawk FY81	FY81
Award Contract, Patriot		
NCIFF Design	FY82	-
Confirm NIS Dratt STANAG	FY81	-
Award Contract, Mark ()		
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 1981 RDTE REQUEST: (§ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE	4045	402	9496	Continuing	Not Applicable
Funds (current requirements) Funds (as shown in FY 1981	4043	402	9490	Contracting	
submission)	4045	5017	13140	Continuing	Not Applicable

Part of the FY81 funds were allocated to higher priority projects. Remaining FY81 funds were decreased to \$400,000 by Congressional action. Project D243 has decreased in FY82 to reflect that Patriot NCIFF effort will begin with a design study, rather than hardware. Project D268, Combat Reconnaissance Surveillance Target Acquisition Data Link (CASTADL), has decreased from \$4703 to zero in FY82. Project D297 has increased from \$3734 to \$5901 in FY82 to cover initiation of advanced development for the Mark () portion of NIS.

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

UNCLASSIFIED

11-89 C1, 31 Har 81

white tracts

Program Element: # 6.37.06.A

DUD Mission Area: #254 - Tactical Command & Control

Title: Identification Friend-or-Foe (IFF) Developments
Budget Activity: #4 - 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 air defense IFF 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 IFF Program, with the primary objective being the timely definition and introduction of the NATO identification System (NIS). Project D297, IFF NATO, 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. Project D243, IFF Developments, is directed toward developing special signal processing techniques for nuncooperative (possive) identification, to enable positive identification of hostiles and friends with malfunctioning transponders.

 Additionally, the US has a significant investment in the current air defense identification system, the Hark XII. 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 NIS 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 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 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.
- H. (U) WORK PERFORMED BY: Army 1FF activities are managed by the Combat Surveillance and Target Acquisition Laboratory at Ft Normouth, NJ. The Hill Lincoln Laboratory of Lexington, MA, is the system engineering contractor for NIS. The non-cooperative IFF work for Hawk is being performed by Scope Electronics of Reston, VA. Work on Mark XII improvements has been performed by Hazeltine Corporation of Greenlawn, NY, and Teledyne Electronics of Newbury Park, CA.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

UNCLASSIFIED

11.90

Program Element: # 6.37.06.A
DOD Mission Area: #254 - Tactical Command & Control

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

1. (U) FY 1980 and Prior Accomplishments:

- a. (U) Completed a draft Standardization Agreement (STANAG) for the NATO Identification System (NIS) in the NATO Working Group. Completed preliminary system definition at the M.I.T. Lincoln Laboratory and delivered a structure of use of the NIS waveform at Lincoln Laboratory.
- b. (U) Successfully completed contract for design and computer simulation of a noncooperative IFF signal processor for improved Hawk. Awarded contract for advanced development model.
- c. (U) Completed Mark XII ECM vulnerability measurements on interrogators for AN/TPX-46 (Hawk, Patriol), AN/TPX-50 (Forward Area Alerting Radar), AN/PPX-3 (Stinger), and MSR-400/5 (US Roland). Completed design of circuit improvements for AN/IPX-50.

2. (U) FY 1981 Program:

- a. (U) IFF NATO (D297): Continue system definition of NIS at M.I.T. Lincoln Laboratory. Complete initial phase of the Training and Doctrine Command (TRADOC) study to determine potential operational utility of battlefield portion of NIS (study utilizes computer simulation of combined arms engagement). Construct and test experimental versions of proposed LIS waveforms to test performance. Conduct multipath tests to assess signal environment. Initiate study to determine potential for utilizing existing IFF band for new system. Attend NATO Working Group and trilateral meetings to obtain agreement on major frequency and waveform parameters.
- b. (U) IFF Developments (D243): Complete construction of a noncooperative IFF signal processor for Improved Hawk, and begin Force Development Test and Evaluation (FDTE).

3. (U) FY 1982 Planned Program:

- a. (U) IFF NATO (D297) Continue system definition of NIS. Complete trade-off studies on optimum irequency band for Nark (). Award contract for advanced development models of air defense portion of NIS, Nark (), for Army-peculiar populations. Start Tri-Service Mark XII Technical Improvement Program (TIP). Complete study on effectiveness of Battlefield IFF and system specification. Continue participation in trilateral forum and NATO Working Group.
 - b. (U) IFF Developments (D243): Complete testing and evaluation of noncooperative IFF signal processor for

UNCLASSIFIED

11 11 C1, 31 Har 81

in his time can be

Program Element: # 6.37.06.A DOD Mission Area: #254 - Tactical Command & Control Title: <u>Identification Friend-or-Foe (IFF) Developments</u>
Budget Activity: <u>#4 - Tactical Programs</u>

Improved Hawk. Begin design effort and computer simulation to apply technique to other Army air defense systems (Patriot, Roland, etc.). Develop improvements for Mark XII interrogators on Stinger and Roland, and initiate development of non-cooperative techniques for ground combat applications.

4. (U) FY 1983 Planned Program:

- a. (U) IFF NATO (D297): Award contract for advanced development models of Battlefield IFF (BIFF) portion of NIS, for identification of tanks by other tanks, attack helicopters, etc. Continue contract for construction of idvanced development models of air defense portion of NIS Mark (). Continue NATO and trilateral interfaces.
- b. (B) IFF Developments (D243): Award contract for advanced development model of noncooperative IFF signal processor for Patriot. Continue design efforts for other Army applications (Roland, etc.). Continue development of Mark XII improvements for Army interrogators, and noncooperative techniques to identify ground combat vehicles.
- 5. (U) Program to Completion: This is a continuing program. Future efforts will include completion of development and test of the Mark () and BIFF systems and extension of noncooperative techniques to ground combat applications.

UNCLASSIFIED

11.92

add Boks art

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D297
Program Rlement: #6.37,06.A

DOD Mission Area: #254 - Tactical Command and Control

Budget Activity: #4 - Tactical Programs:

- A. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: Projections of future conflicts in Central Europe depict a Marsia 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 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.P, Combat Identification Technology; PE 6.35.15.N, Advanced Identification Technology; 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 crilateral 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 Monmouth, NJ. The Massachusetts Institute of Technology (MIT) Lincoln Laboratory of Lexington, MA, is the system engineering contractor for NIS.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Completed a draft Standardization Agreement (STARA:) for the NATO Identification System in the NATO Working Group. Completed preliminary system definition at the MIC Lincoln Laboratory and

UNCLASSIFIED

ect: #D297 Title: Identification Friend or Foe NATO
ogram Blement: #6.3/.06.A Title: Identification Friend or Foe Developments
DOD Mission Area: #254 - Tactical Command and Control Budget Activity: #4 - Tactical Programs Project: #0297 Program Element: #6.3/.06.A

delivered a Strawman US design to UK and FRG. Constructed experimental version of modulator and processor for the NIS waveform at Lincoln Laboratory.

- 2. (U) FY 1981 Program: Continue system definition of NIS at MIT Lincoln Laboratory. Complete initial phase of TRADOC study to determine potential operational utility of battlefield portion of NIS (study utilizes computer simulation of combined arms engagement). Construct and test experimental versions of proposed NIS waveforms to test performance. Conduct multipath tests to assess signal environment. Initiate study to determine potential for utilizing existing IFF band for new system. Attend NATO Working Group and trilateral meetings to obtain agreement on major frequency and waveform parameters.
- 3. (U) FY 1982 Planned Program: Continue system definition NIS. Complete trade-off studies on optimum frequency band for Mark (). Award contract for advanced development models of air defense portion of NIS, Mark (), for Army-peculiar applications. Complete study on effectiveness of Battlefield IFF, and system specification. Continue participation in trilateral forum and NATO Working Group.
- 4. (U) FY 1983 Planned Program: Award contract for advanced development models of Battlefield IFF (BIFF) portion of NIS, for identification of tanks by other tanks, attack helicopters, etc. Continue contract for construction of advanced development models of air defense portion of NIS, Mark (). Continue NATO and trilateral interfaces.
- 5. (U) Program to Completion: This is a continuing program. Future efforts will include completion of development and test of the Mark () and BIFF systems and extension of noncooperative techniques to ground combat applications.
- 6. (U) Major Milestones: NATO IFF program for FY82 includes complete system specification for the air defense applications and award 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 1990 Submission
Confirm NIS Draft STANAG Award Contract, Mark () Adv. Dev.	FY81 FY82	- -
Award Contract, BIFF Adv. Dev.	FY83	FY81

UNCLASSIFIED

11 94

mhillian art

Project: #D297
Program Element: #6.37.06.A
DOD Mission Area: #254 - Tactical Command and Control
Budget Activity: #4 - Tactical Programs

Contract for construction of advanced development models of BIFF has been deferred to FY83 to allow time for the Army to thoroughly analyze operational requirements for the system before proceeding with hardware.

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

RDTE	FY 1980 Actual	PY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	3695	0	6020	0	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3700	4611	3734	-	Continuing	Not Applicable
Quantities (current requirements) Ouantities (as shown in FY 1980	Not Applia	cable				
submission)	Not Applie	cable				

Decrease in funding in PY81 is due to allocation of funds to higher priority projects during the programing and budgeting cycle, and to Congressional cuts. Runding was increased in FY82 to fund the Army share or alwanced development of the Tri-Service NATO Identification System, Mark (). FY83 funding for MK() is currently being determined.

Other Appropriations: Not Applicable

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.07.A
DOD Mission Area: #256 - 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 1980 Actual 2315	FY 1981 Estimate 4075	FY 1982 Estimate 6451	FY 1983 Estimate 8870	Additional To Completion Continuing	Total Estimated Costs Not Applicable
D246	Tactical Communications						
	Development	1495	2151	4075	4954	Continuing	Not Applicable
D437	Tactical Rapid Communications	820	1924	2376	3911	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT: 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. Specific steas of exploitation include millimeter wave transmission, fiber optics cable systems, antenna systems, and high-frequency communication systems.
- C. (II) BASIS FOR FY 1982 REQUEST: Complete the fiber optic (FO) missile payout system and millimeter wave (MAW) multichannel command post radios (MCPR) contracts and conduct testing in coordination with the users. Start new contracts for an intrusion-resistant FO cable system, an extended range FO missile payout system, an improved tactical area FO distribution system, mobile intercept-resistant radios (MISR) and IF radio communications program (a new task). Project D437 funds are requested to start the Electromagnetic Compatibility/Vulnerability (EMC/EMV) analysis for Phase III of the Single-Channel Ground and Airborne Radio System (SINCGARS). In addition, technical efforts on bit error detection and correction techniques for quasi-analog and digital s single-channel radio systems will be continued. The Survivable Low-Profile Antenna (SLFA) for combat tracked vehicles, sdvanced development models, will be delivered and tested at the Armor Center.

UNCLASSIFIED

11-96

white the said of

Title: Communications Development
Budget Activity: 14 - Tactical Program: Program Element: #6.37.07.A

DOD Mission Area: #256 - Tactical Communications

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Escim ated Cost
RDTE Funds (current requirements)	2315	4075	6451	Continuing	No: Applicable
Funds (as shown in FY 1981 submitssion)	2990	4349	9073	Continuing	No: Applicable

The funding difference in FY80 is due to higher priority Army requirements. The decrease in FY82 dab the result of general Congressional reductions.

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

UNCLASSIFIED

Program Element: #6.37.07.A

DOD Mission Area: #256 - Tactical Communications

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

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: In millimeter wave transmission, new techniques of microwave millimeter wave power amplification will be applied to line-of-sight and troposcatter radio systems in an effort to provide a signal hiding capability. In fiber optics, the technology will be applied to develop a less costly, more flexible, and jamming-resistant cable system, and to incorporate the technology into existing Army tactical communications systems. In antenna systems, new microprocessor techniques will be applied to achieving desired radiation patterns by controlling antenna radiating elements. In addition, current antenna deficiencies such as high physical profile, low physical survivability and compromised electrical efficiency will be evaluated. By applying new technology, these deficiences may be overcome. In high-frequency systems, technology will be applied to developing systems for strategic communications and vulnerable satellite systems.
- G. (U) RELATED ACTIVITIES: Program Element 6.11.02.A (Research); Program Element 6.27.01.A (Communications Engineering Development); Program Element 2.80.10.A (Tri-Service Tactical Communications Program). Related research and studies performed by the Air Force and Navy. Coordination is accomplished by Department of the Army reviews, through exchange of technical reports and attendance at scientific meetings and conferences.
- H. (U) WORK PERFORMED BY: Norden Systems, Norwalk, CT; Hughes Aircraft Co., Tucson, AZ, and five additional contracts whose total FY 1982 cost is \$2,570,000. Contract monitoring and in-house development are the responsibility of the US Army Communications Research and Development Command, Fort Monmouth, NJ.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishement: Started and completed contractual development of a local Distribution Fiber Optic (FO) Cable Communications System for the interconnect/interface and message-processing shelters of the AN/TYC-39 message switch; the program was transitioned for incorporation into the AN/TYC-39 production contract. Started contracts for an FO missile payout system and FO distribution system and Millimeter Wave (MMW) multichannel command post radios. Continued engineering support and evaluation for the family of quick-erect antenna masts. Awarded contract for the Survivabile Low-Profile Antenna (SLPA).
- 2. (U) FY 1981 Program: Complete the area FO distribution system contract and conduct revaluation tests. Continued contracts for the FO missile payout system and MMW multichannel radio (MCPR). Process procurement actions (D&F) for an intrusion-resistant FO cable system, an extended range FO missile payment system, and an improved Army Tactical Communications Systems (ATACS) area distribution system. Continue Advanced Development (AD) efforts on SLPA. Award AD contracts for high-power amplifier and broadband vehicular antenna.

UNCLASSIFIED

11-98

mhillian arti

Program Element: #6.37.07.A

DOD Mission Area: #256 - Tactical Communications

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

- 3. (U) FY 1982 Planned Program: Complete the FO missile payout system and conduct Development and Operational (DT/OT-1) tests with MICOM and TRADOC. This system provides communications for an antiarmor weapons system capable of defilade-to-defilade operation. Start contracts for an intrusion-resistant FO cable system which will not require use of COMSEC components, an extended range FO missile payout system and the improved ATACS area FO distribution system. Complete advanced development of the MMM, using results of the program to start engineering development in FY 1982; start specifications for a two-year contract to develop mobile intercept-resistant radios (MISR) for tracked vehicles and for handheld use; start HF Communications system technology. Project D437 will continue technical support on the High-Power Amplifier, Survivable Low-Profile Antenna and Broadband Vehicular Antenna. Complete Advanced Development (AD) efforts on the Quick Erect Antenna masts (QEAM) and transition to Engineering Development into Project Element (PE) 6.47.01.A, Engineering Development for Single-Channel Ground and Airborne Radio System (SINCGARS), Project 1488.
- 4. (U) FY 1983 Planned Program: Complete contract and conduct tests for the improved Army Tactical Communications System (ATACS) area Fiber Optic (FO) distribution system; Continue contracts for an intrusion resistant FO cable system, extended range FO missile payout system, MMW mobile intercept-resistant radios and HF Communications. Start contract for a multiple access FO data buss system. Continue development of efforts to support single-channel tactical communications.
- 5. (U) Program to Completion: This is a continuing program. Funding for HF Communications will start in FY 1982 and in FY 1983 for Antenna Development.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Blement: 16.37.11.4 Title: Aircraft Electronic Warfare (EW) Self-Protection Equipment

NOD Mission Area: 1257 - Electronic Warfare/Counter-C31 Budget Activity: 14 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 6975	FY 1981 Estimate 7315	FY 1982 Estimate 12428	FY 1983 Estimate 20103	Additional to Completion Continuing	Total Estimated Cost Not Applicable
DB 52	Scout/Attack Helicopter Survivability Equipment	2655	5244	7723	11298	Continuing	Not Applicable
n653	Special Electronic Mission Aircraft (SEMA) Survivability Equipment	4320	2071	4705	8805	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides the advanced development efforts which are required to provide the US and allied aircraft with protection against enemy infrared, optical, laser and/or radar-directed threats. The program is the continuation of efforts to achieve the survivability required to accomplish the Army attack, assault, and special electronic mission aircraft (SEMA) mission requirements. The program is structured to preclude Service duplication and reflects the Army's responsibility for the implementation of a Tri-Service Memorandum of Agreement reached in 1977. 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 198' RDTE REQUEST: FY82 funds are required for advanced developments which address the current and future threat to Army aviation as represented by the SA-13, SA-8, SA-6, SA-4, and future variants and by newly enhanced capabilities of the ZSU-23-4, SA-7, and SA-9. The three most serious threats are in air defense fire control systems employing (I) TV and optical systems which enhance low-altitude kill capability, (2) radars operating at millimeter wave frequencies, and (3) radars employing monopules and pulse doppler signal processing. The FY82 program provides the following major hardware thrusts: (1) the continued development of the AN/ALQ-169 optical warning location/detection (OWL/D) system, (2) millimeter wave countermersures, (3) tri-Service program of monopulse countermeasures development and testing, and (4) a vulnerability reduction program to provide ballistic hardening/fire protection for tactical helicopters.

UNCLASSIFIED

11 100

a laboration of

Program Element: #6.37.11.A

DOD Mission Area: #257 - Electronic Warfare/Counter-C31

Budget Activity: #4 - Tactical Programs

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

	FY 1980	PY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	6975	7315	12428	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	6975	7324	13938	Continuing	Not Applicable

Differences between current requirements and the FY 1982 submission reflect the results of more definitive information on the funds required for several of the tasks.

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

UNCLASSIFIED

Program Element: #6.37.11.A Title: Aircraft Electronic Warfare (EW) Self-Protection Equipment
DOD Mission Area: #257 - Electronic Warfare/Counter-C31 Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program combines two advanced development (AD) projects managed by the Army Project Manager for Aircraft Survivability Equipment (PM-ASE): PE #6.37.11.A/DB52, Scout/Attack Helicopter Survivability Equipment, and PE #6.37.11.A/D653, Special Electronic Mission Aircraft (SEMA) Survivability Equipment. Both projects were initiated after the Soviets introduced the SA-7 shoulder-fired, surface-to-air missile (SAM) in the Mideast. The objectives of DB52 are systems engineering, signature reduction, infrared (IR) suppression, effectivenes; measurements and evaluations, and ballistic hardening and/or vulnerability reduction. The objectives of Project D653, Special Electronic Mission Aircraft Survivability Equipment, are the development of warning devices and active infrared (IR), optical and radar countermeasures. In 1972, the SA-7 was used against Army helicopters in Vietnam. Army helicopters were quickly equipped with IR suppressors and low-reflectance paint. The success of the suppressors provided credible evidence of the tactical ability of helicopters to operate against surface-to-air missiles. This success coupled with demonstrations of the ASE program. In 1973 a Joint US Army Training and Doctrine Command/US Army Material Development and Readiness Command (TRADOC/DARCOM) Working Group was formed to determine requirements for ASE and address current and future threats to Army aviation. An extensive analysis of the survivability of Army aircraft in a number of combat scenarios with and without ASE was performed. The analysis provided survivability benefits as a function of cost, penalty, and development risk which led to the development of specific requirements for ASE to address the IR, radar, and optical threats. This analysis by the TRADOC/DARCOM Joint Working Group defined the tasks within this program. Periodic updates maintain a viable program to address the changing threat.
- C. (U) RELATED ACTIVITIES: 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, Joint 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 laser warning receivers for most helicopters and selected fixed-wing aircraft, radar jammers 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 missile 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 aircraft (SEMA), and ultraviolet (UV) missile warning detectors for selected helicopters and fixed-wing aircraft. The Air Force is responsible for IR missile warning detectors for fixed-wing aircraft and selected helicopters. International coordination is achieved through North Atlantic Treaty Organization (NATO) NATO Army Armaments Group (NAAG), and Objective Parking Groups.

UNCLASSIFIED

11.102

polici Maria de la constanta d

Program Element: #6.37.11.A

Title: Aircraft Electronic Warfare (EW) Sell Protection Equipment

Bod Mission Area: #257 - Electronic Warfare/Counter-C31

Budget Activity: #4 - Tactical Programs

H. (U) <u>WORK PERFORMED BY</u>: US Army Aviation Research and Development Command (AVRADCOM), St. Louis, MO 163 Army Electronics Research and Development Command (ERADCOM), Electronic Warfare Laboratory (EWL), Ft Monmouth, NJ; US Arm Armament Research and Development Command (ARRADCOM), Dover, NJ. Contractors: Sanders Associates, Inc., Nashua, NH; ITT Corporation, Notley, NJ; FRACOR, Inc., Austin, TX; Hughes Helicopter, Culver City, CA; Calspan Corporation, Buffalo, NY; Petkin Elmer, Morarik, CT; Applied Technology, Inc., Mountain View, CA; Tasker Systems, Charsworth, CA; Martin Marietta, Orlands. FL; Hughes Aircraft, Culver City, CA; Honeywell Inc., Lexington, MN; Bell Helicopter, Hurst, TX.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1980 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 alreaft in Germany, lords, and the United States. Advanced Development (AD) was completed, and engineering development (ED) was initiated for IR suppressors for growth threats on the following aircraft: OH-58 (FY 1975), OV-1 MONAMK (FY 1975), AM-1 COBRA (FY 1977), and RU-21 GUARDRAIL (FY 1977). Infrared jammers applicable to attack, observation, and utility helicopters, including AH-64 and UH-60 BLACKHAWK, completed AD in FY 1976. A pulse doppler missile detector, AN/ALQ-136 for AH-1 COBRA A/C, completed advanced development (AD) in FY 1977. An advanced radar warning receiver, APR-39(V)2 for special electronic mission aircraft (SEA), 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 (OML/D) system started in 1916 and continuous wave radar jammer for SEMA aircraft. Developments of countermeasures against millimeter wave radars were initiated with the development of a millimeter wave capability for the AR-3 radar warning receiver (RVR). A feasibility study of USN/USAF advanced self-protection radar jammer (ASP1) was initiated to assess suitability/adaptability for Army use. Self-Protection Radar Jammer (ASP1) Study was initiated to define technology and hardware modifications to upgrade Alfreaft Survivice development and test program was initiated to define technology and hardware modifications to upgrade Alfreaft Survivice development and test program was initiated to define technology and hardware modifications to upgrade Alfreaft Survivice development and test
 - 2. (U) FY 1981 Program: The advanced Self-Protection Radar Jammer (ASPJ) feasibility study will be completed.

IINCLASSIFIED

Program Element: #6.37.11.A Title: Alreraft Electronic Warfare (EW) Self-Protection Equipment
DDD Mission Area: #237 - Electronic Warfare/Counter-C31 Budget Activity: #4 - Tactical Programs

Participation in the Tri-Service monopulse countermeasure efforts will continue, and the millimeter-wave radar warning receiver effort will be completed. Development will continue for the AN/ALQ-169 Optical Warning Location/Detection System; the AN/ALQ-136 millimeter-wave frequency extension, and the All-15 fuel fire-retardant system. Advanced development will be initiated for millimeter-wave chaff cartridges and for low Radar Cross Section (RCS) rotor hub cover for the All-15.

- 3. (II) FY 1982 Planned Program: Advanced development efforts will be initiated for Directed-Energy countermeasures; advanced infrared jammer techniques to counter third-generation infrared missile systems, advanced passive radio frequency (RF) countermeasures; advanced radar warning receiver capabilities to address near-term threats; Optical (High Energy Laser) coatings and optical decoys; and to increase the Ground Emitter Trainer for Aviators (GRETA) capability. Development will continue for the AN/ALQ-169 and AH-15 fuel fire-retardant system. Advanced development will be completed for monopulse counter-measures, AN/ALQ-136 millimeter-wave frequency extension, and the low Radar Cross Section rotor hub cover.
- 4. (B) FY 1983 Planned Program: Advanced development will be initiated for improved missile detector performance; advanced threat trainer demonstrations; advanced threat optical warning/optical jammer; and active optical countermeasures against antitank guided missiles. Development efforts will continue for Direct-Energy countermeasures, advanced infrared jammer, advanced passive radio frequency (RF) countermeasures, optical coatings/optical decoys, and capability extension of Ground Emitter Trainer for Aviators (GRETA). The AN/ALQ-169 and the AH-LS fuel fire-retardant system advanced development efforts will be completed.
- 5. (U) <u>Program to Completion</u>: This is a continuing program. The aircraft survivability equipment and electronic warfare self-protection countermeasures advanced development programs respond to stated user requirements and threat documentation. The requirements and threats are reviewed on a continuing basis by the Aircraft Survivability Equipment (ASE) Permanent Steering Group (PSG) 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 Tri-Service Memorandum of Agreement by the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS).

UNCLASSIFIED

11-104

Address of the

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DB52
Program Element: #6.37.11.A
DDD Mission Area: #257 - Electronic Warfare/Counter C3 I Budget Activity: #4 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is the advanced development and concept feasibility demonstration of aircraft survivability equipment required for the survival of scout and attack helicopters in a hostile air defense environment composed of infrared, radar, and optically directed weapon systems. The approach includes an analytical determination of equipment and specifications for development using US Army Training and Book in the Command (TRADOC) battlefield scenarios, approved threats, and US Army Materiel Development and Readiness Command (DARCO 1) equipment. The equipment selected for development is that with the potential to significantly enhance the staying power and combat effectiveness of the aircraft. The task includes signature suppression, threat warning and jamming equipment, as well as the ballistic hardening of aircraft components. Also covered are the development of measuring and evaluation techniques and equipment and necessary program management to support the Aircraft Survivability Equipment (ASE) program. Alternatives are determined by the DARCOM/TRADOC Permanent Steering Group requirements analysis. Foreign state-of-the-irl and enemy threat intelligence is considered throughout the project.
- B. (U) <u>RELATED ACTIVITIES</u>: Related Aircraft Electronic Warfare Self-Protection (AEWSP) developments are conducted by the Air Force and Navy for their specific needs. To preclude duplication of effort, these developments are coordinated through reviews conducted by the Office of the Under Secretary of Defense for Research and Engineering (USDRE), subgroups and working panels of the Technical Cooperation Program, the Joint Tri-Service Electronic Warfare Panel, and the Joint Technical Coordinating Group on Aircraft Survivability (JTGC/AS). Formal requirements documents submitted by each Service are also reviewed by the other Services. Tasks in this project are coordinated with those in Project D653, Special Electronic Mission Aircraft (SEMA) Equipment, also in Program Element #6.37.11.A, to preclude internal duplication of effort. Tasks which successfully complete advanced development (AD) in this project progress to engineering development (ED) in Program Element #6.47.11.A, Aircraft Electronic Warfare (EW) Self-Protection Systems.
- C. (U) WORK PERFORMED BY: US Army Aviation Research and Development Command (AVRADCOM), St. Louis, NO; US Army Electronics Research and Development Command (ERADCOM), Electronic Warfare Laboratory, Ft. Monmouth, NJ; US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. Contractors: Sanders Associates, Inc., Nashua, NH; ITT Corporation, Nutley, NJ; TRACOR, Inc., Austin, TX; Calspan Corporation, Buffalo, NY; Loral, Inc., Yonkers, NJ; American Electronics Laboratory, Lansdale, PA; Bell Helicopter International, Pt. Worth, TX; Garrett Air Research, Los Angeles, CA; Perlin-Elmer, Norwalk, CT; Honeywell Inc., Lexington, MN; Science Applications, Inc., Huntsville, AL; General Dynamics Corp., Powent Division, Pomona, CA

UNCLASSIFIED

Project: #0852
Program Element: #6.37.11.A
DOD Hission Area: #257 - Electronic Warfare/Counter C31 Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (D) FY 1980 and Prior Accomplishments: In 1976, improved versions of the infrared (IR) suppressors, used to defeat the effectiveness of the SA-7 missile in the Republic of Vietnam, were fielded to frontline US tactical aircraft in Germany, Korea, and the United States. Advanced development (AD) was completed, and engineering development (ED) was initiated for IR suppressors for growth threats on the following aircraft: Oil-58 (FY 1975), OV-1 MOHAWK (FY 1975), AH-1 COBRA (FY 1977), RU-21 GUARDRAIL (FY 1977). Infrared jammers applicable to attack, observation, and utility helicopters, including the AH-64 advanced attack helicopter and the UN-60 Blackhawk helicopter, completed AD in FY 1976. An optically designed flat-plate canopy, which reduced sun glint, entered engineering development (ED) in 1975 for the AH-1 and OH-58 aircraft. An improved light shade of IR paint modeled after an Air Force development began ED in 1977 for Special Electronic Mission Aircraft (SEMA). First-phase advanced development flight testing of the AN/ALQ-169 Optical Warning Location/Detection System was completed, and the system requirements for second phase were defined. Plight testing of the Tri-Service AN/AAR-46 ultra-violet missile detector was completed with the Army conducting missile firings at Sandia Base, NN. Advanced development of AH-15 fire-retarcant system for in-flight fuel fires was continued. Advanced threat demonstration efforts were initiated for millimeter-wave frequency extension of the AN/ALQ-136 radar jammer. Infrared signature measurements of AH-13 and UH-60A were completed.
- 2. (U) FY 1981 Program: The second phase of advanced development for the AN/ALQ-169 will be initiated with emphasis on alreaft integration and cost/complexity reduction. Development efforts will continue for the AN/ALQ-136 Millimeter-Wave frequency extension and for the AH-18 fuel fire-retardant system. Advanced development will be initiated for millimeter-wave chaff cartridges for M130 chaff/flare dispenser system. Advanced development of a low Radar Cross-Section rotor hub cover for the AH-18 will be initiated based upon exploratory development efforts.
- 3. (U) FY 1982 Planned Program: The AN/ALQ-136 Millimeter-Wave frequency and the low Rader Cross Section rotor hub cover advanced development efforts will be completed. Advanced development for the AN/ALQ-169 and AN-1S fuel fire retardant system will continue. Advanced threat demonstration efforts will be initiated for optical (High Energy Lasers) contings and optical decoys. Development effort will be initiated to increase the Ground Emitter Trainer for Aviators (GRETA) capability to include features of the AN/AVR-2 Laser Warning Receiver.
 - 4. (U) FY 1983 Planned Program: The AN/ALQ-169 and the AH-18 fuel fire-retardant system advanced development efforts

UNCLASSIF!2D

11-106

ichi kaka ara

Project: #DB52
Program Element: #6.37.11.A
DOD Mission Area: #257 - Electronic Warfare/Counter C³I Budget Activity: #4 - Tactical Programs

will be completed. Advanced development will continue for optical coatings, optical decoys, and capability extension of Ground Emitter Trainer for Aviators (GRETA) for AN/AVR-2. Advanced threat demonstration efforts will be initiated for optical warning/optical jammer, and for active optical countermeasures against antitank guided missiles.

- 5. (U) <u>Program to Completion</u>: This is a continuing program. The survivability equipment and electronic warfare self-protection countermeasure advanced development programs respond to stated user requirements and threat documentation. The requirements and threats are reviewed on a continuing basis by the Aircraft Survivability Equipment (ASE) Perminent 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 tri-Service Memorandum of Agreement by the Joint Technical Coordinating Group on Aircraft Survivability (JTCG/AS).
 - 6. (U) Major Milestones: Not Applicable.
 - 7. (U) Resources (\$ in thousands):

RDTE	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1981	2655	5244	7723	11,298	Continuing	Not Applicable
submission)	2665	5209	7445	-	Continuing	Not Applicable

Aircraft Procurement Army: Not Applicable

Differences in FY91 and FY82 reflect adjustments for inflation and minor subtask realignments.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.13.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Information Distribution Systems (JTIDS)
Budget Activity: 44 - Tactical Programs

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

Project Number	<u>Title</u>	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
b370	TOTAL FOR PPOGRAM ELEMENT Army Data Distribution	4388	20477	19087	41 333	36153	121438
	System (ADDS)	0	17557	19087	41333	36153	115130
D137	JTIDS	4388	2920	0	0	0	7308

4388 2920 0 0 0 7308

8. (U) <u>RRIEF DESCRIPTION OF ELEMENT AND MISSION NEED:</u> The emerging battlefield automated systems of the mid-to late-1980's will require near-realtime, jam-resistant data communications. These communications are needed to support command and control, air defense, field artillery, intelligence and logistics systems. The effectiveness of current systems is limited by restricted data throughput, voice/data contention problems on FM radio nets, a lack of adequate automatic relay, and poor mobility. This effort will take advantage of two systems presently under development. PE 6.47.27.A, Command and Control, Project DC98, Position Location Reporting System (PLRS), is completing engineering development in FY 1981 and the Joint Tactical Information Distribution System (JTIDS), in PE 6.47.02.A, Joint Tactical Information Distribution Systems, is a joint Army/Air Force development entering engineering development in FY 1981. By taking advantage of the advanced state of these two projects, it will be possible to produce a system for the Army in the late 1980's which will satisfy the data distribution need. Without this program the Army's automated systems will have limited effectiveness in a full electronic warfare environment on the highly mobile battlefield of the future.

C. (U) BASIS FOR FY 1932 RDTE REQUEST: In FY 1980 the concept of combining PLRS and JTIDS was studied, and a system definition was developed. During FY 1981 PLRS and JTIDS hardware will be integrated and the capability to piss data between the two systems will be proven. In FY 1982 interfaces with existing operational systems will be started. The capability of ADDS to support these systems will be tested in the tested at the Hughes Alreraft Corporation, Fullerton, Culifornia, during FY 1982 and FY 1983. The total development costs are based on an independent government cost estimate done by the program manager's office. This estimate was validated by the cost analysis office of the Communications Research and Development Command. Cost estimate is supported by experience with both the PLRS and JTIDS programs.

UNCLASSIFIED

11-108

Bullet Barrer and Barrer

Program Element: #6.37.13.A Title: Joint Tactical Information Distribution Systems
DOD Mission Area: #256 - Tactical Communications Budget Activity: #4 - Tactical Programs

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

	FY 1980	PY 1981	r' 1982	Additional To Completion	Tot: Estimated Cosi
RDTE Funds (current requirements)	4388	20477	19087	77486	1214 16
Funds (as shown in FY 1981 submission)	0	21991	15682	16769	62530

D370 - Decrease in FY 1981 is attributable to the application of general Congressional reductions. Most of the FY 1982 and beyond increase was caused by two factors. First, completion of the design concept studies allowed for a government independent cost estimate based on a well-defined program. Second, the testbed JTIDS terminals were initially planned for OPA. However, because of the status of the JTIDS program their purchase has been moved to RDTE. Other increases for inflation are included in FY 1982 and beyond. D137 was restructured to this Program Element for FY 1982.

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

UNCLASSIFIED

Program Element: #6.3/.13.A
DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Information Distribution System
Budget Activity: 14 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: The Army Data Distribution System (ADDS) is an integration of the Position Location and Reporting System (PLRS), which is completing engineering development, and the Joint Tactical Information Distribution System (JTDS), which has the tactical class 2 terminal ready for engineering development. This program was initiated by the Army in recognition of the potential of merging both systems to meet an early fielding of a critical Army operational need to improve data distribution and position location reporting in support of Army automated bittlefield systems and operations. The ADDS system will satisfy requirements for realtime data distribution, position location, and identification. The heart of the system is the Net Control Unit/Master Unit (NCU/NCM) which performs the net management and control functions of the system. There will be five of these units in a typical division area. Enhanced PLRS user units (EPUU) will be furnished users that have limited data requirements such as Stinger and the Multiple Launch Rocket System. Combination (EPUU/JTIDS) terminals will be furnished those few users, such as Tacfire that need to send information to EPUU or JTDS users. There will be JTIDS terminals for high data requirements such as those of Tacfire, IRawk Air Defense System, and Patriot Missile System. Without this data communications improvement, highly sophisticated and highly effective weapons systems will not operate to full potential, and the Air Defense community will not have a responsive means of providing early warning, cueing, aircraft identification, and weapons command/control information on a realtime basis to short-range Air Defense systems. The project was included under Program Element #6.37.07.A, Communications Development, on the PY 1981 RTE. CDS.
- G. (U) RELATED ACTIVITIES: PE 6.37.07.A, Communications Development, Project D137, Joint Tactical Information Distribution System (JTIDS), accomplished the Phase I concept definition and evaluation for this program. This program element will also be supported by PE 6.47.02.A Joint Tactical Information Distribution Systems, during the remaining phases of the program.
- H. (U) WORK PERFORMED BY: In-house developing agencies are the United States (US) Army Communications Research and Development Command (CORADCOM), the US Army Electronics Research and Development Command (ERADCOM). Contractual efforts are provided by MITRE Corporation, Bedford, MA; Hughes Aircraft Company, Fullerton, CA; Litton Data Systems, Van Nuys, CA.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: Efforts for this program began in FY 1980 under PE 6.37.07.4, Communications Development. A Letter of Agreement (LOA) for the Position Location Reporting System/Joint Tactical Information Distribution: System Hybrid (ADDS) was approved by the Combat and Materiel Developers and on 6 July 1979 by the Department of the Army. The Army was authorized to proceed with the ADDS development by the Office of the Secretary of Defense on 8 August 1979. This program will be carried out in a series of evolutionary developments and four test phases using a building block approach. Integral to each phase is a test period to verify the design/development activities of the

UNCLASSIFIED

11-110

College San West

Program Element: #6.37.13.A

DOD Mission Area: #256 - Tactical Communications

Title: Joint Tactical Information Distribution Systems
Budget Activity: #4 - Tactical Programs

program. The establishment of a hybrid testbed will be initiated in FY 1981 integrating the engineering development models of Position Location Reporting System (PLRS) and JTIDS Class I equipment. Continuation of testbed activities in 1982 will carry over in FY 1983 when interface testing of potential user weapons systems will take place. Upgrading PLRS and JTIDS terminals will take place in PY 1984 to provide increased communication capability and current softwire/firmware. System test and evaluation is scheduled from FY 1984 through FY 1986 by exercising the system within a representative slice of a combat division.

- 1. (U) FY 1980 and Prior Accomplishments: During FY80 the Hughes Aircraft Company (HAC), Fallerton, California, completed the Definition and Evaluation (Phase 1) of the ADDS System. HAC developed the design concept for ADDS and analyzed division level data need lines to determine if the concept would satisfy the Army's data requirements. Results of the HAC effort supports entering Phase 2 of the ADDS development.
- 2. (U) FY 1981 Program: Phase 2 was initiated in July 1980. This phase will verify the interspeciability of PLRS and JTIDS by exchanging data between the two systems. To do this the testbed being implemented at HAC includes five PLRS user units, a PLRS master unit, five JTIDS terminals (2 Hughes Class 1 "Alternate Waveform" terminals, 2 Singer-Kearfott Class 2 Advanced Development Model terminals, and one IBM Adaptable Surface Interface Terminal (ASIT) containing a Hughes Improved Terminal), and appropriate interfaces to allow a suitable representation of the ADDS system to be actived. To Illustrate battlefield operations, scenarios approved by the various Army schools will be exercised.
- 3. (U) PY 1982 Planned Program: Depending on the success of Phase 2, Phase 3 in FY82 will establish an interface capability with selected battlefield systems, complete the development of the enhanced Position Location Reporting System (PLRS) user unit, and provide an initial net management software capability for the Net Control Unit. Army devices with which the expanded testbed will interface include the Digital Message Device, Interactive Display Terminal (or Digital Communications Terminal DCT), AN/TSQ-73 Radar, Battalion Fire Direction Center, Hawk missile fire unit and Firefinder Radar. Realistic scenarios will be exercised using all elements (hardware, software, and operations) of the Army Data Distribution System (ADDS).
- 4. (U) FY 1983 Planned Program: Completion of the exercise portions of Phase 3. Begin Phase . which will provide a complete prototype system to be tested at Hughes and sent to Fort Bliss, Texas, in FY84 for use with the Short-Range Air Defense Command and Control testbed. Complete technical testing and demonstrations will be conducted, including examination of continuity of operations.

UNCLASSIFIED

Program Element: #6.37.13.A

DOD Hission Area: #256 - Tactical Communications

Title: Joint Tactical Information Distribution System
Budget Activity: 44 - Tactical Programs

5. (U) Program to Completion: The ability to support air defense and its command and control requirements will be demonstrated in the field at Fort Bilss. In Phase 5 an essentially deliverable ADDS system to support one-half an Army division will be available for extensive operational testing at Fort Hood, Texas, with the 1st Cavalry Division. The development/testing of ADDS will be completed in FY86. IOC is planned for late FY86.

UNCLASSIFIED

11-112

John Wilson C.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.21.A DOD Mission Area: #215 - Land Combat Support Title: Chemical Defense Materiel Concepts
Budget Activity: #4 - Tactical Programs

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

Project <u>Mumber</u>	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 14888	FY 1981 Estimate 21231	FY 1982 Estimate 20476	FY 1983 Estimate 16956	Additional to Completion Continuing	Total Estimated Cost Not Applicable
	QUANTITIES						
DE80	Individual Cml Protection Materiel	0	3430	634	2636	Continuing	Not Applicable
DE81	Cml Decontamination Materiel	2128	5231	3169	2217	Continuing	Not Applicable
DT 3.0	Collective Protective Haterial for Armored Vehicles	5940	4380	5369	5556	Continuing	Not Applicable
D601	Cml Detection & Warning						
	Materiel	6430	5724	10248	6063	Continuing	Not Applicable
D604	Collective Cml Protection						
	Materiel	390	2466	1056	484	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 protective 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 system 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.

UNCLASSIFIED

Program Element: #6.37.21.A

DOD Micsion Area: #215 - Land Combat Support

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

C. (U) BASIS FOR FY 1932 RDTE REQUEST: Advanced Development (AD) will be initiated on an aviation respirator system and continued on numerous items of collective protection equipment for shelters, vans, and tactical armored vehicles. In the chemical agent detection and alarm area, development will continue on a remote sensing and detection alarm, a detector kit for chemical agents in water, an automatic liquid agent alarm, an alarm training simulator, and a chemical attack warning and transmission system. Work will continue on the development of decontamination systems for clothing and a rapid decontamination system for tactical vehicles. These items are essential to meet the objectives of a totally integrated chemical-biological (GB) defense posture.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Co⊹t
ROTE Funds (current requirements)	14888	21231	20476	Continuing	No: Applicable
Funds (as shown in FY 1981 submission)	17230	23217	23678	Continuing	No: Applicable

DEBO - \$500 thousand to FY 1980 was reprogramed to other chemical defense projects because of the lack of an approved requirements document for the aviation protection mask. This project was reduced by \$1241 thousand in FY 1982 to reflect a revisel scope and funding requirement to initiate advanced development (AD) efforts on the aviation protective mask.

DEST - The scope of this project was reduced by \$2857 thousand in FY 1980 and \$1381 thousand in FY 1982 because several decontamination requirement documents were not approved as anticipated.

DJ30 ~ This project was increased by \$1999 thousand in FY 1980 to support additional AD work on the hybrid collective protection equipment for armored vehicles. The \$144 thousand increase in FY 1982 is the result of refinement in program cost estimates.

D601 - This project was increased by \$1636 thousand in 1980 and \$3507 thousand in the FY 1982 to fund those detection and warning devices that are/will be supported by approved requirement documents and proven technology.

UNCLASSIFIED

11-114

Linuaria .

..

Program Element: #6.37.21.A
DOD Mission Area: #215 - Land Combat Support

Title: Chemical Defense Materiel Concepts
Budget Activity: 14 - Tactical Programs

6094 - This project was decreased by \$2620 thousand in FY 1980 and by \$4231 thousand in FY 1982 to conform to a reduction in the scope of the program.

The FY 1981 funding decreases for projects DE80, DE81, DJ10, D601, and D604 reflect the application of general Congressional reductions.

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

UNCLASSIFIED

- - -

Program Element: #6.37.21.A

DOD Mission Area: #215 - Land Combat Support

Title: Chemical Defense Materiel Concepts
Budget Activity: 14 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: After the 1973 Mideast War and the suspected use of chemical agents in Lans, intensive coordination between the material user and the material developer was begun to identify urgent field needs and translate them into requirements. The reported use of chemical agents in Afghanistan has intensified these efforts. 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 for 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) <u>RELATED ACTIVITIES</u>: Memorandum of Understanding (MOU) between the United States and Canada on the protective mask and canisters provides for the US developing protective masks and Canada developing filter canisters. The Army-approved Required Operational Capability (ROC) for the New Protective Mask has been converted to a Joint Service Operational Requirement for Joint-Service application. Companion Engineering Development work is being done under Program Element 6.47.25.A, Chemical Defense Materiel. Related Exploratory Development work is conducted under Program Element 6.27.06.A, Chemical Defense and General Investigations, Project A553, Chemical Biological Defense and General Investigations.
- H. (U) MORK PERFORMED BY: In-house: Chemical Systems Laboratory, Aberdeen Proving Ground, MD; Human Engineering Laboratory, Aberdeen Proving Ground, MD; Arctic Test Center, Fort Greeley, AL; and Tropic Test Center, Panama. Contract: Calspan, Buffalo, NY; Honeywell, Orlando, FL; Bendix, Towson, MD; Donaldson, Minneapolis, MN; American Air Filter, Ellicott City, MD; and Brunswick, Marion, VA.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishements: 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 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 ventilant

UNCLASSIFIED

11-116

a la terra i na

Program Element: #6.37.21.A DOD Mission Area: #215 - Land Combat Support Title: Chemical Defense Materiel Concepts
Budget Activity: #4 - Tactical Progras

tion parameters, liquid agent transport, agent transport due to personnel entry/reentry, and crew compirtment decontamination. During FY 1980 the following were accomplished: (1) Phase I prototype tests and a Special in Process Review (IPR) were held on the Decontamination Apparatus Portable, XM13; (2) a Letter of Agreement (ACD) initiated on the Interior Surface Decontamination System; (3) AD was initiated on the Interior Surface Decontamination Device (Jet Exhaust System); (4) AD contract was awarded and concept feasibility IPR and conducted on the Testing Kit for Chemical Agents in Water, XM272; (5) AD was continued on the hybrid collective protostion 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.

- 2. (U) FY 1981 Program: This is a continuing program which supports AD of new/improved decontamination systems, detection and warning systems, collective protection equipment for shelters, armored vehicles, vans, and associated equipment. AD will continue on: (1) the Simplified Collective Protection Equipment, XM20; (2) the Rapid Decontamination Apparatus; (3) Clothing Decontamination System; and (4) the Automatic Liquid Agent Detector, XM82. AD will be completed on the Remote Sensing Chemical Agent Alarm, XM21. AD will be completed and type classification accomplished on the Portable Decontamination Apparatus, XM13. AD will continue on the Testing Kit for Chemical Agents in Water, X1.72. Efforts on the water test kit will include the initiation of Development Test I/Operational Test I (of I/OT I). AD dioris initiated in FY80 to develop and test a hybrid collective protection system for armored vehicles will continue. The hybrid method of protection offers the greatest operational flexibility by allowing operation as an overpressure system, a ventilated facepiece system, or simultaneous operation of both systems. AD will be initiated on the Advanced Chemical Agent Detector Marm (ACADA).
- 3. (U) FY 1982 Planned Program: AD will be completed on the Testing Kit for Chemical Agents in Water, XM272, rapid decontamination, clothing decontamination, and interior surface decontamination systems, and the Advanced Chemical Agent Detector Alarm (ACADA). AD will continue on the Automatic Liquid Agent Detector (ALAD), XM82. AD will be initiated on the aviation respiratory system and the detection and alarm components of the NBC reconnaissance vehicle. The following will be accomplished on the Simplified Collective Protection Equipment, XM20: (1) complete DT I/OT I; (2) initiate DT II/OT II; and (3) conduct Validation In-Process Review (VAL IPR). AD will continue on the hybrid collective protection system for application to a variety of armored vehicles.
- 4. (U) FY 1983 Planned Program: AD will continue on the aviation respiratory system, the improved personnel decontamination kit, a universal decontaminant, and the decontamination station kit. AD will be completed on the Automatic Liquid Agent Detection, XM82; the Simplified Collective Protection System, XM20; the Detector Kit for Chemical Agents in Water, XM272; and the hybrid collective protection system.

UNCLASSIFIED

Program Element: 16.17.21.A DOD Hission Area: 1215 - Land Combat Support Title: Chemical Defense Materiel Concepts
Budget Activity: 14 - Tactical Programs

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

UNCLASSIFIED

11-118

White will a

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DE81
Program Element: #6.37.21.A
DOD Mission Area: #215 - Land Combat Support

Title: Chemical Decontamination Material
Title: Chemical Defense Materiel Compts
Budget Activity: 44 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: The Union of Soviet Socialist Republics (USSR) and Warraw Pact (WP) nations have a recognized technological advantage over the United States (US) in decontamination capabilities which significantly enhances their ability to conduct sustained operations in a toxic environment. An accelerated decontamination program was initiated by the Army in Hay 1978. The objectives of the program are to achieve at least parity with the USSR/WP and provide a survival and sustained operational capability for US forces on a chemically contaminated battlefiell. An Army Science Board Ad Noc committee reviewed the Army's decontamination program from October 1978 to March 1979. The Committee's report reemphasized the urgency for the accelerated program and made recommendations for improvement. The purpose of this project is to conduct Advanced Development on new systems designed to quickly and effectively decontaminate personnel and equipment in the field. This is the only project in the Department of Defense for Advanced Development of decontamination material.
- B. (U) <u>RELATED ACTIVITIES</u>: Advanced Development is conducted on decontamination/contamination avoidance concepts completing Exploratory Development under Program Element 6.27.06.A, Chemical-Biological Defense and Gene all investigations. In accordance with Department of Defense (DOD) Directive \$160.5, which designates the Army as Executive gent for Chemical Warfare/Chemical-Biological Defense Research, Development, Test and Evaluation, work is planned and a complished in response to requirements from all Services. Items or systems of Army and Joint service interest which complete Advanced Development progress to Engineering Development under Program Element 6.47.25.A, Chemical Defense Materiel, Project DF97, Chemical Decontamination Materiel.
- G. (U) <u>MORK PERFORMED BY:</u> Contractors: Brunswick Corporation, Marion, VA; In-house developing organization is the United States Army Chemical Systems Laboratory, Aberdeen Proving Ground, MD.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Advanced Development on the XM13, Decontamination Appearitus, Portable, was initiated in FY78. The apparatus is to be carried on all tactical vehicles and will significantly improve the capability of crews to decontaminate their vehicles in the field and continue their mission. During FY 1979, two cancepts were selected for further competitive development. Work continued on the technical report providing information on the decontamination of nuclear weapon systems. The program supported the initiation and development of the Army's polyurethme paint application pilot test program to evaluate the efficiency of polyurethme paint as a means of contamination avoid one or reducing decontamination effort. Data from the pilot program will also be used to conduct an operational cost-effectiveness analysis. The

UNCLASSIFIED

Project: #DE31

Program Element: #6 37.21.A

DOD Mission Area: #215 - Land Combat Support

Title: Chemical Decontamination Materiel Title: Chemical Defense Materiel Concepts

Budget Activity: 14 - Tactical Programs

pilot test program will be completed in the 1Q FY 1981. During FY 1980, phase I of the prototype tests and a Special In-Process Review were held on the XM13 Portable Decontamination Apparatus. A Letter of Agreement requirements document was approved, and Advanced Development was initiated on an Interior Surface Decontamination System. A Large-Scale Rapid Decontamination Device (jet exhaust) entered Advanced Development. A report on the decontamination of nuclear weapons was completed.

- 2. (U) FY 1981 Program: The polyurethane paint pilot test program will be completed and the report published. Advanced Development will be completed on the XM13 Portable Decontamination Apparatus and the item type classified. The Large-Scale Decontamination Device and the Interior Surface Decontamination System will contine Advanced Development, and a Decontamination System for Clothing will enter this phase of development.
- 3. (U) FY 1982 Planned Program: Advanced Development will be completed on the Large-Scale Decontamination Device, the Interior Surface Decontamination System, and the Decontamination System for Clothing. Testing of prototype models of the systems will be completed to validate the feasibility of the design concepts to meet stated user requirements.
- 4. (U) FY 1983 Planned Program: Advanced Development will be initiated on a Decontamination Station Kit for decontamination of medical canualties and an Improved Personal Equipment Decontamination System that will provide the individual soldier a greater capability to reduce the level of immediate or residual hazards from contaminated personal equipment. Development Test I and Operational Test I (OT I/OT I) plans will be prepared, and construction will be initiated on prototype items for testing.
 - 5. (II) Program to Completion: This is a continuing program.
 - 6. (U) Major Milestones: Not applicable.

UNCLASSIFIED

11 120

trail to the same of

Project: #DE81

Program Element: #6.37.21.A DOD Mission Area: #215 - Land Combat Support

Title: Chemical Decontamination Materiel
Title: Chemical Defense Hateriel Concepts
Budget Activity: 4 - Tactical Programs

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

RDTE	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additionat to Completion	Total Estimated Cost
Funda (current requirements)	2128	5231	3169	2217	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4985	5720	4550	-	Continuing	Not Applicable

The \$2857 thousand decrease in FY 1980 expenditures was due to a lack of approved requirements necessity to transition items from Exploratory Development to Advanced Development. The funds were reprogramed to continue Exploratory Development on selected decontamination items. The \$489 thousand decrease in FY 1981 funding level is a result of general reductions by Congress. The decrease of \$1381 thousand estimated funding requirements for FY 1982 is based on a projected decrease in level of required effort to meet user needs (\$1287 thousand) and the result of program realignment to reflect incremental funding policies (\$94 thousand).

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #0.130
Program Element: #6.37.21.A
DOD Mission Area: #215 - Land Combat Support

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

- A. (U) DEFAILED BACKGROUND AND DESCRIPTION: The Soviet Union continues to maintain a significant chemical warfare capability. The evidence is that they regard chemical weapons as an integral part of future tactical warfare. For example, they conduct extensive training exercises which stress operating proficiency in a chemical warfare protective posture, and they have equipped their armored vehicles with collective protection systems. Other Warsaw Pact nations are similarly trained and equipped. To meet this threat, Congress directed in the FY 1978 Department of Defense (DOD) Appropriations Act (PL 95-79) that the Army prepare 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. Or the improved collective protection system will enable the crews to perform combat duties without the encumbrance of comple e individual protective equipment when operating in an NBC-contaminated environment.
- B. (U) <u>RELATED ACTIVITIES</u>: This was a new start in FY 1980. Related work has been done in this area 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 RUFE 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 Ground, MD. Honeywell, Inc., St. Petersburg, FL, is the prime contractor on the Hybrid Collective Protection Equipment (HCPE). Donaldson, Minneapolis, MN, is developing a centrifugal dust separator that can be applied as a product improvement on armored vehicles with ventilating blowers.

IINCLASSIFIED

FI-122

ويريغ للاطران

Project: #DJ30

Program Element: #6.37.21.A

DOD Mission Area: #215 - Land Combat Support

Title: Collective Protection Materiel Ar moved Vehicles
Title: Chemical Defense Materiel Concerts
Budget Activity: 44 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1980 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 Miterial. PE/PROJ 6.37.21.A, DJ30, Collective Protection Material 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 (D8F) was approved July 1979 and (c) Pevelopment Test I Operational Test I (DT 1/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 only to worse vehicle, of the identified as having Congressional interest, requiring the Hybrid Collective Protection Equipment (HCPE). The remaining eight vehicles were carmarked for the Ventilated Pacepiece System. Therefore, providing the hybrid system to US ROLAND has received top priority during FY 1980. In early FY 1980, the XMI Tank, Multiple Launched Rocket System (MLRS), and Division Air Defense Gun (DIVAD) were identified by the user as possible candidates for the hybrid system. A preliminary concept review of the Roneywell Luc, 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.
- 2. (U) FY 1981 Program: Work on information voids and data gap program related to collective projection for armored vehicles and crews will be continued. Development Test I/Operational Test I on the Hybrid Collective Protection Equipment (HCPE) will be completed. The assessment of vehicle crew compartment air leakage reduction concepts will continue. Compatibility/suttability tests directed toward the integration of detection, alarm, and decontamination apparatuses into armored vehicles will continue. The XMI auxiliary power unit (APU) turbine will be evaluated as a possible interior decontamination source. Design, construction, and testing of the prototype centrifugal dust separator will be evaluated as a possible product improvement on armored vehicles with ventilating blowers.
- 3. (U) FY 1982 Planned Program: Continue Advanced Development (AD) of the Hybrid Collection Production 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 effects 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.

UNCLASSIFIED

Project: #DJ30

Program Element: #6.17.21.A

DOD Mission Area: #215 - Land Combat Support

Title: Collective Protection Hateriel Armored Vehicles
Title: Chemical Defense Hateriel Concepts
Budget Activity: 14 - Tactical Programs

- 4. (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 NBC collective protection systems.
 - 5. (U) Program to Completion: Continuing.
 - 6. (U) Major Milestones:

Current	Milestone Dates
Milestone Dates	Shown in PY 1980 Submission
March 1979-November 1981	-Not Shown
March 1982-November 1982	-Not Shown
February 1983	-Not Shown
February 1983	
Pebruary 1984	-Not Shown
	Milestone Dates March 1979-November 1981 March 1982-November 1982 February 1983 February 1983

The Hybrid Collective Protection System will be type classified from a combined advanced and engineering program. In view of this development approach, major milestones are included in this FY 1982 Congressional Descriptive Summary submission. Milestones were not included in the FY 1981 submission.

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

UNCLASSIFIED

11-124

all the facility

Project: #DJ30 Program Element: #6.37.21.A

Title: Collective Protection Material Armorad Vehicles
ent: #6.37.21.A

DOD Mission Area: #215 - Land Combat Support

Title: Chemical Defense Material Concepts
Budget Activity: #4 - Tactical Programs

DUTP.	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE Funds (current requirements)	5940	4380	5369	5556	Continue	Not Applicable
Funds (as shown in FY 1981 submission)	3941	4704	5225	-	Cont Inue	Not Applicable

Increased funding in FY 1980 is due to funds being reprogramed into this project from the companion engineering development Project 6.47.25.A, D023, Collective Protection Materiel for Armored Vehicles. The adjusted funds in both projects were adequate to conduct the revised program. The FY 1981 decrease reflects the application of general Congressional reductions. Increased funding in FY 1982 results from adjustments to compensate for pay raises and inflation.

Other Appropriations: Not Applicable.

UNCLASSIFIED

FY 1982 RDTE CONCRESSIONAL DESCRIPTIVE SUMMARY

Project: #D601
Program Element: #6.37.21.A
DOD Mission Area: #215 - Land Combat Support

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/acrosol form. The suspected use of chemical agents in Afghanistan has caused an intensification of research and development efforts and the chemical special in-process 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 bevelopment of an integrated detection and monitoring capability for all known threat agents to prevent contamination and rendering our combat forces ineffective, determine the need for decontamination, and give the all-clear for rehabitation.
- 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-MBC 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. Contract: 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 1989 and Prior Accomplishments: During earlier years Advanced Development (AD) was completed on the M256 Chemical Detector Kit, X1207 Chemical Attack Warning and Transmission System, and XM9 Liquid Agent Detector Faper. During FY 1979, the key effort was the reinitiation of AD on Remote Sensing Chemical Agent Alarm, XM21. During FY 1980, the following was accomplished: (1) AD contract was awarded on the XM272 Testing Kit for Chemical Agents in Water; (b) initiated AD and approved the Letter of Agraement (LOA) on the Automatic Liquid Agent Detector, XM82; and (c) Continued AD on the XM21 Remote Sensing Chemical Agent Alarm. A special in-Process Review (Apr 80) on the XM21 approved a new milestone schedule because more AD rime is required to solve technology problems. Development Test I (Optrational Test I (DTI/OTI) was initiated on the XM21. Current design of XM21 prototype indicates higher power requirement and system weight than the user prescribes.

UNCLASSIFIED

11-126

other warrant

Project: #D601

Program Element: #6.37.21.A

DOD Mission Area: #215 - Land Combat Support

Title: Chemical Detection and Warning Materiel Title: Chemical Defense Materiel Concepts
Budget Activity: 14 - Tactical Programs

- 2. (U) FY 1981 Program: The following will be accomplished on the XM21 Remote Sensing Chemical Agent Alarm: (a) continue AD, (b) Complete DTI/OTI, (c) prepare the Required Operational capability (ROC), (d) Conduct Department of Army Decision Review. The following will be accomplished on the XM82 Automatic Liquid Agent Detector (ALAD): (a) continue AD (b) award advanced development contract, and (c) conduct Special In-Process Review. The following will be accomplished on the XM272 Water Testing Kit: (a) continue AD, (b) conduct Special In-Process Review, and (c) initiate/complete DF 1/OT 1. AD will be initiated on the detection and warning components of the Nuclear, Biological, and Chemical (NBC) Reconnaissance System.
- 3. (U) FY 1982 Planned Program: Complete AD on the Detector Kit for Chemical Agents in Water, XH272. Validation In-Process Review (VAL IPR) will be conducted on the water test kit (3QTRFY82). Continue AD on the advanced Chemical Agent Detector and Alarm (ACADA) and Automatic Liquid Agent Detector (ALAD), XM82. Initiate AD on detection and alarm components of the NBC Reconnaissance Vehicle.
- 4. (U) FY 1983 Planned Program: Complete AD and conduct Validation In-Process Review (VAL IPR) on the Automatic Liquid Agent Detector (ALAD), XM82. The following will be accomplished on the Automatic Chemical Agent Percetion/Alarm (ACADA), XM83: (a) conduct Development Test I/ Operational Test I, (b) develop requirements document, (c) prepare and distribute final New Equipment Training Plan, (d) and conduct VAL IPR.
 - 5. (V) Program to Completion: This is a continuing program.
 - 6. (U) Major Milestones: Not Applicable.
 - 7. (U) Resources (\$ in thousands):

KDTE	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Listimated
Funds (current requirements)	64 30	5724	10248	6063	Continuing	rot Applicable
Funds (as shown in FY 1981 submission)	4794	6230	6741	-	Continuing	hot Applicable

UNCLASSIFIED

Project: #0601
Program Element: #6.37.21.A
DOD Hission Area: #215 - Land Combat Support

Title: Chemical Detection and Warning Materiel
Title: Chemical Defense Materiel Concepts
Budget Activity: #4 - Tactical Programs

Increase in FY 1980 funding is due to refinement in program cost estimates. The FY 1981 decrease reflects the application of general Congressional reductions. Increase in FY 1982 funding is due to refinement in program cost estimates and initiation of AD on the detection and alarm components of the NBC Reconnaissance System which was added to the program since the FY 1981 submission.

UNCLASSIFIED

11-128

olither was 12

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.23.A DOD Mission Area: #254 - Tactical Command and Control Title: Command and Control
Budget Activity: #4 - Tactical Programs

A. (9) RESOURCES (PROJECT LISTING): (\$ in thousands)

							Total
Projec	et e	FY 1980	FY 1981	FY 1982	FY 1983	Additional	Esthanted
Number	r Title	Actual	Estimate	Estimate	Estimate	To Completion	Costs
	TOTAL FOR PROGRAM ELEMENT	8764	12075	22379	27182	Continuing	Not Applicable
D101	Tactical Automation	8964	12075	3550	8328	Continuing	Not Applicable
D185	Military Software						
	Standardization			3311	3782	Continuing	Not Applicable
2136	Military Computer Family			13656	13214	Cont Enging	Not Applicable
D192	Ada Joint Program Office			1862	1958	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Today, commanders must be provided the capability to know the complete tactical situation in near-realtime. This program pursues this goal by accelerating the fielding and the survivability of battlefield automated systems. It will provide a common, compatible family of computers (Military Computer Family), transportable software products and tools (including implementing Ada, the common tactical high-order computer programing language), intelligent input/output levices (terminals, displays, storage devices, etc.), to provide multilevel secure operating systems and distributed processing techniques to promote survivability on the battlefield, and development of computer resource management policy, procedures, regulations, and training to assure reduction of computer resource proliferation. This will allow continued competition, reduce proliferation of computer types, eliminating costly life cycle development in post-deployment maintenance phases, and prevent small production bases with costly sole source follow-on procurements. Buttlefield survivability will be enhanced with training and logistics simplicity.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: These funds are assential to continue development of Ada and necessary software support tools. A mijor training effort is planned to introduce Ada to the military and civilian work force. Major afforts are planned for development and testing of a compatible family of military computers, peripherals, and terminals. Computer resource management policy and standardization control will continue. The development of secure operating systems will be initiated.

UNCLASSIFIED

Program Element: #6.37.23.A
DOD Mission Area: #254 - Tactical Command and Control

Title: Command and Control

Budget Activity: #4 - Tactical Programs

Current Milestone Dates

Major Milestones	Milestone Dates	Shown in FY 1981 Submission
Initiate parallel competitive contracts for MCF	FY81	FY81
Configure software development facility for Post Deployment Support efforts	FY81	PY8I
Initiate devolopment of life cycle software tools	FYS1	PYSI
Complete development of Ada Eanguage system	1Q FY82	2Q FY82
Develop code generator for MCF computer	FY82	FY82
Initiate Development of Common Operating System (TACEXEC)	FY82	FY82
Develop additional code generators for Ada language system	FY83	

UNCLASSIFIED

11:130

Children and

Program Electric: #6.37.23.A DOD Mission Area: #255 - Tactical Command and Control Title: Command and Control
Budget Activity: 4 - Tactical Programs

Dovelopment Test for Advanced Development Molels of MCF

FY82

The delay of one quarter in completion of Ada was due to the cost negotiation phase in the contractors' solicitation. The last milestone replaces the milestone development test for brassboard of MCF computers. The change in date is due to a restructuring of the program to include a new instruction set architecture.

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

	FY 1990	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	8964	12075	22379	Continuing	Not ∧pplicable
Funds (19 shown in FY 1981 submission)	8964	12998	25902	Continuing	Not Applicable

The decrease in FY 1982 is due to a restructuring of the MCF program and a projection of funds to establish the Ada Joint Program Office. The decrease in FY 1981 reflects the application of general Congressional reductions.

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

UNCLASSIFIED

Program Element: #6.17.23.A

DOD Mission Area: #254 - Fictical Command and Control

Title: Command and Control
Budget Activity: 14 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: To meet the mission need, this program provides the advanced development of software languages. Initial emphasis will be on the Ada language and requirements tools. In the second phase the standarlized and configuration-managed tools will be used for the specification and implementation of multiprocessor and microprocessor systems configurations. The final phase will provide techniques, procedures, and tools for the detection, control, and correction of field software failures with a rejuction of required skill levels in the field. A compatible family it military computers (MCF), intelligent microprocessor-based terminals and peripheral devices, data distribution, operating systems and associated equipment will be developed. To promote a more survivable battleffield, another program is in the action of list ributed processing and secure software. Required policy, procedures, regulation, and training will be provided.
- G. (U) RELATED ACTIVITIES: This project is related to all Army battlefield automation systems as it will provide a studir's impunge fimily of computers and software for such systems. The instruction-set architecture to be used in the MCP, Nobalis (MIL-STD 1852), is under joint Air Force-Army management and control based on a Memorindum of Agressent of 12 September 1980 between the Air Force Systems Command and the Army Miteriel Development and Readiness Command. This project is related to the Ticrical Fire Direction Systems (TACFIRE), 2.37.26A; Communication Electronics, 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. There is no unnecessary Juplication of effort within the Army or the DOD. Coordination to avoid duplication is accomplished through the Department of Defense Computer Resources Technology Panel of the Management Steering Committee for Embedded Computer Resources and the High-Order Linguage Working Group (HDLMG).
- H. (U) WORK PERFORMED BY: Carnegie-Mellon University, Pittsburgh, PA; Softech Inc., Walthum, MA; Teledyne Grown Engineering, Huntsville, AL; Higher Order Software, Cambridge, MA; EG&G, Rockville, MD; Computer Sciences Corporation, Montestown, MJ. Inchause development is performed by the US Army Communications Research and Development Command.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FITURE PROGRAMS:
- 1. (U) FY 1980 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 architectures to determine performance on military problems. An advanced architecture, Nebula, was designed. This architecture is oriented to Aia and to realtime computation, and it provides security capabilities. Proposals for MCF were submitted on 29 August 1980. A contract to develop Ada was awarded to Softech, Inc. A Software Development Support System (5053) was estimated to certify all software products and tools for Army software support centers. A factical display system overlay generator and validation of the mass storage technology into Army-based computer systems were initiated. The UNCLASSIFIED

EL-132

Salat Miller auf 1

Program Element: #6.37.23.4

DOD Mission Area: #254 - Factical Command and Control

Title: Command and Control
Budget Activity: 44 - Tactical Programs

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 management plan developed. Computer support was provided to Army organizations. 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, Nunsement 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. Mock progressed on a maintenance information delivery system. A cost algorithm and design guile was inveloped for a Test Program Set (TPS).

- 2. (U) FY 1981 Program: The four-step bid evaluation for AD of MCF will be completed, and up to four competitive contracts will be awarded in April 1981. The Nebula Control Board will issue MiL-STD-1862A, the final standard. Nebula support software and valifation software will be designed and tested. Procurement for facility for testing the MCP will be initiated. Initiated a contract for the MCF compatible family of intelligent terminals and peripherals. Award two competitive contracts for the design in Ada of two different battlefield automated systems intended to exploit the various generic functions of the language. Start an Ada training program for the Army and DOD community. Implement the Ada test cases. The Army expects to provide funds for the Ada Joint Program Office when established. The management of planning for the integration of Army tactical data systems with feeder systems will be continue. General engineering support to Project Managers and centers will also continue. Existing Army standards and procedures in the area of computer resource management will be improved. Participation on NATO, joint service, and Army panels involved with computer resource management and standardization will continue. The development of a secure kernel operating system for the Army standard Software Support and Development System (SDSS) computer will be started. Distributed processing techniques for the maneuver battlefield element will be investigated. The conversion of existing support software to execute on the SDSS computer will begin.
- 3. (U) FY 1932 Planned Program: The Military Computer Family effort will transition to its own project in FY32, D186 (under 63723A). Hilitary Software Standardization will also transition to its own project in FY82, D185 (under 6.37.23A). Development of Ada will be completed, and additional target generators and tools will be identified for subsequent development. Validation, verification, and testing of Ada will continue. Ada education programs will be defined. Development of an Ada code generator for the MCP computer will begin. Development of life cycle support standards and guidelines will be initiated. Ada program design studies will be initiated. Participate on NATO, joint service, and Army panels involved with computer resource management and standardization. The secure kernel operating system for the SDSS computer will be developed. The transition of existing support software to the SDSS will be completed. Distributed processing and data processing techniques to promote survivibility for battlefield functional areas will be developed. The Army has programed to provide the Army share for support to the Ada Joint Program Office. This effort will help standardize the software effort for the Department of Defense.

Program Element: #6.37.23.A
DDD Mission Area: #254 - Tactical Command and Control

Title: Command and Control

Budget Activity: 44 - Tactical Programs

4. (U) FY 1983 Planned Program: Continue development of MCP standard terminals, peripherals, and software and Ada code generators. Products and tools of the Ada language will continue to be improved and supplied to other users. Training programs for Ada will be formalized.

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

UNCLASSIFIED

11-134

, little a con t

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D186
Program Element: #6.37.23.A
DOD Mission Area: #254 - Tactical Command and Control

Title: Military Computer Family (MCF)
Title: Command and Control
Budget Activity: 14 - Tactical Programs

A. (II) DETAILED BACKGROUND AND DESCRIPTION: The increasing complexity, apecd, and lethality of modern warfare have made automation on the battlefield essential for weapon system and equipment control and to provide the commander with an up-to-the-minute grasp of battlefield information from which he can make decisions. This will entail the introduction of sophisticated yet rugged computers into the field in increasing numbers. Proliferation of types already complicates logistics, maintenance, and training. No single standard has been found to be adequate. The challenge is to transition from proliferation to standardization of a single Military Computer Family. But standardization tends to be the antichesis of advancing technology, flexible evolution, and competition. Goals for the MCF program are (1) technology insertion to take advantage of rapid advances in computer technology in order to realize improvements in reliability, performance, capacity, cost, size, weight, and power and to assure supportability; (2) open competition for computers that is sustained throughout the acquisition life-cycle; (3) reduction of acquisition and support costs over the life-cycle; (4) reduction of time from inception to fielding of battlefield automation systems (BAS); (5) avoidance of unnecessary proliferation of types of battlefield computers; (6) high reliability of computers; (7) ease of maintenance (fault detection and isolation, parts replacement); (8) interchangeability of parts across different systems; (9) provision for distributed processing to accommodate degraded mode operation, graceful degradation, and load shifting; (10) minimum logistics support burden; (11) flexibility for system evolution to support system functional expansion and change. The approach planned to meet the above goals is to provide a wide range of computing capabilities via several subfamilies and standards (hardware and software) for the field and for support. A software-compatible and plug-compatible family of computers will employ the same advanced standard instruction-set architecture, interfaces, busses, configurations, and enclosures. The computers will use standard peripheral devices and fieldable software products. On the development and support side, a single standard high order language (ADA) and standard software development and post-deployment support tools will be used. This family will constitute a standard product line that all battlefield automation managers will be expected to use. (In July 1980, the Assistant Secretary of the Army established policy and a transition plan for the use of MCF and ADA in all future BAS.) An open solicitation is planned that will lead to the award of up to four contracts for competitive advanced development (AD) of the MCF. Each contractor is expected to deliver AD models in 21 months. The competition will be in the spirit of A-109 with each developer having the opportunity to develop his own total solution to meeting the performance/goal "envelope." The competitive emphasis in AD will be on achieving the best life cycle cost (including ILS approach) and operational effectiveness profile, and on developing the technology/approach that will be used to achieve the performance/goal envelope in production models. Toward this end, a Technology Insertion Plan will be required from each contractor 21 months after the date of award that presents his planned approach, in detail, to achieve the goals, not in the AD model, but in the full-scale development (FSD) model and

UNCLASSIFIED

Project: #0186

Program Element: #6.37.23.A

1254 - Tactical Command and Control DOD Mission Area:

Title: Military Computer Family (MCF)
Title: Command and Control
Budget Activity: #4 - Tactical Pro

- Tactical Program.

in the production units. The AD model will be a stepping stone toward the goals. The technical approach being taken is to delay for as long as reasonable the freezing of technology for production units, delivery of which will be in in 1986. The AD phase will end with awards of FSD contracts to two of the initial competitors based upon a second competition. During the FSD period, these contractors will complete ILS packages and will deliver models for the DT/OT II fly-off and for use by PM's committed to the use of MCF in their systems. The production decision is planned for early in CY 1986, as is the production contract award. It is planned that the fly-off will end with the winner being awarded a fixed-price flye-year requirements contract. The approach outlined above will provide an intensity of competition that should satisfy industry's demand for participation, and adequately address the problems of sole source and old technology. A cyclic development is planned that will produce software and plug-compatible upgraded computers via new open competitions every five years.

- RELATED ACTIVITIES: This project is related to all Army battlefield automation systems as it will provide a standand family of computers for such systems. The instruction-set architecture to be used in the MCF is under joint Air Force-Army management and control based on a Memorandum of Agreement of 12 September 1980 between the Air Force Systems Command and the Army Materiel Development and Readiness Command. Related exploratory development work is conducted under 6.27.01.A, Tactical Automation Technology. Previous advanced development work on this project was conducted under Project DIOI of 6.37.23.A. The Department of Defense Management Steering Committee for Embedded Computer Resources has coordination responsibility over all service computer standardization 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. In this regard, there is a close relationship between the MCF Project and the VMSIC Program (6.27.04.F). There is no unnecessary duplication of effort among the Army's MCF Program, the Navy's NECS and AN/AYK-14 Programs, and the Air Fried's MIL-STD-1750 Program. Critical related projects within 6.37.23.A are the ADA Project (D101 and D185) and the MCF Intelligent Terminal Family (D101).
- C. (U) WORK PERFORMED BY: Primary contractors have been performing work on MCF under 6.37.23.A, D101, and 6.27.01.A, A094. They are listed here for continuity: EGGG, Rockville, MD; Carnegie-Mellon University, Pittsburgh, PA; General Research Corporation, McLean, VA; Research Triangle Institute, Research Triangle Park, NC. The in-house developing organization responsible for the project is the US Army Communications Research and Development Command, Fort Monmouth, NJ.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Prior accomplishments were funded by 6.37.23.A, D101, and 0.27.01.A, A094. They are listed here for continuity. Extensive analyses of existing computer development and weapons system programs were

UNCLASSIFIED

f1~136

militare in the

Project: #0186

Program Element: #6.37.23.A

DOD Mission Area: 1254 - Tactical Command and Control

Title: Military Computer Family (MCF)
Title: Command and Control
Budget Activity: #4 - Tactical Programs

conducted, and revised technical and acquisition strategies were developed for the Military Computer Family that should reduce risk and enhance industry interest. A contract was awarded to Carnegie-Mellon University for work on instruction-set architectures. Experimental evaluations were conducted of existing architectures to determine performance on military problems. An advanced architecture, called Nebula, was designed and has been evolving with the help of industry and other services. This architecture is oriented to the new DDD high-order language, ADA, and to realtime computation, and it provides 32-bit virtual address and security capabilities. Nebula (MIL-STD-1862) is now under joint Air Force-Army control based on a Memorandum of Agraement signed by AFSC and DARCOM. Nebula will be the architecture of the Military Computer Family. A contract was awarded to EG&G for work in the area of MCF hardware system architecture. MCF system requirements were delineated and computer interfaces specified. Following several major briefings to industry, review of preliminary specifications and Statement of Work for MCF, an RFQ was released on 11 July 1980. Proposals were submitted on 29 August 1930. A contract was awarded to General Research Corp. for the development of an MCF life-cycle cost model and for logistics support planning.

- 2. (U) FY 1981 Program: The FY 1981 MCF Program will be conducted under 6.37.23.A, D101, and 6.27.46.A, A094, and is described here to maintain continuity since this project will pick up work at the 6.3 level in FY82. The four-step bid evaluation for AD of MCF will be completed, and four competitive contracts will be awarded in April 1981. Evolution of the Nebula (MIL-STD-1862) instruction-set architecture will continue under joint Air Force-Army control. All of the MCF contractors will be involved in this activity. Completion of fine-tuning of Nebula is planned for November 1981, and the Nebula Control Board will issue MIL-STD-1862A, the final standard. Nebula support software and validation software will be designated and tested. A facility for testing MCF computers and interfaces will be planned and producement initiated. Design of the MCF life-cy-le cost model will be completed. Initiative will be taken to include the Navy in the joint Nebula control activity.
- 3. (U) FY 1982 Planned Program: Design plans for AD models of MCF computers will be completed, and a preliminary design review held. The Testability Program Plan, Reliability Program Plan, Reliability Production Report (first issue), Producibility and Engineering Plan, and Testability Program Report will be completed as will competing hardware functional designs of the computers and a final design review. Nebula evolution and refinement will be completed and MIL-STD-1862A will be issued. Development of the MCF test facility will be completed.
- 4. (U) FY 1983 Planned Program: The following competitive advanced development efforts will be completed: Technology Insertion Plan, Reliability Prediction, delivery of MCF computers and completion of acceptance tests, Final Producibility and Production Engineering Plan, Producibility Analysis, Nuclear Survivability Requirements Analysis, Life Cycle Cost Analysis,

UNCLASSIFIED

Project: #0186 DOD Mission Area: #254 - Tactical Command and Control Title: Military Computer Family (MCF)
Title: Command and Control
Budget Activity: 44 - Tactical Programs

5. (U) Program to Completion: Technology insertion designs will be completed, and additional quantities of AD models will be delivered and tested. Transitioning to full-scale development (to PE 6.47.27.A, D287) will commence. Shile this is not a "level-of-effort" project, it will be a continuing effort to permit the award of new competitively based (from AD forward) production contracts on a five-year cycle in order to avoid sole-source lock-in and technological obsolescence.

6. (U) Major Hilestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Award of Competitive Advanced Development		
Contracts for the MCF	Apr 81	FY 1981
Final Instruction-Set Architecture (Nebula)	Nov 81	Not Shown
Standardized (MIL-STD-1862A)		
Technology Insertion Plans	Jan 82	Not Shown
Functional Designs of MCF	Jun 82	Not Shown
MCP Test Facility Operational	Dec 82	Not Shown
Delivery of AD Models of MCF	Jan 83	Not Shown
DT I Completed	Jul 83	Not Shown
Technology Insertion Design	Oct 83	Not Shown
Initiative of Next Cycle AD of MCF	Jun 84	Not Shown

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

ROTE	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Foral Estimated Cost
Funds (Current Requirements	0	0	1 36 56	13214	Continuing*	
Funds (as shown in FY 1981 submission)			Not Shown			

UNCLASSIFIED

11-138

Contract Contract Contract

Project: #D186
Program Element: #6.37.23.A
DOD Mission Area: #254 - Tactical Command and Control

Title: Military Computer Family (MCF)
Title: Command and Control
Budget Activity: 44 - Tactical Programs

*The MCP 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 estimated cost to complete the initial advanced development cycle is \$31000.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.26.A

DOD Mission Area: #216 - Land Combat Service Support

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

A. (8) RESOURCES (PROJECT LISTING): (\$ in thousands)

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 7528	FY 1981 Estimate 6032	FY 1982 Estimate 6824	FY 1983 Estimate 8303	Additional To Completion Continuing	Total Estimated Costs Not Applicable
DG01	Combat Engineer Equipment	2845	2814	3270	3353	Continuing	Not Applicable
DG14	Container Distribution						
	Equipment	230	247	207	104	Continuing	No: Applicable
DK 39	General Support Equipment	0	0	559	1397	Continuing	No: Applicable
DK41	POL Distribution Systems	3633	2503	1727	1688	Continuing	Not Applicable
D428	Tactical Rigid-Wall Shelters	820	468	1061	1761	Continuing	Not Applicable
D471	Camouflage	0	0	0	0	Continuing	Not Applicable
D526	Marine-Oriented Logistics					•	• • •
	Equipment	0	0	0	0	Continuing	Not Applicable

8. (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. A new family of standard, multipurpose tactical bridging will improve capabilities for crossing rivers and other natural barriers. New water purification equipment will efficiently provide potable water from any source, including nuclear-, biological-, and chemical-contaminated environments. The myriad of existing vans and shelters of various

UNCLASSIFIED ~

11-140

held a call

Program Element: #6.37.26.A DOD Mission Area: #216 - Land Combat Service Support Title: Combat Support Equipment
Budget Activity: 4 - Tactical Programs

sizes and types will be replaced by a new family of multipurpose tactical shelters. New hardened shelters will protect suphisticated 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.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Funding is required to conduct Advanced Development (AD) of major components and described the subsystems for Bridging for 1985 and Beyond; access and egrees 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 fuela 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. Planned efforts in project D471 (Camouflage) have been deferred due to lack of approved user requirement documentation. Project D526 (Marine Oriented Logistics Equipment) has been terminated in response to Congressional direction to eliminate Army RDTE efforts on watercraft.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	7528	6032	6824	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	8576	6897	9630	Continuing	Not Applicable

The reduction in FY 1980 funding results from the combined effects of the following:

DG01 - A \$59,000 reduction in funding based on refined cost estimates. DK39 - Deferral of all planned effort due to lack of approved user requirements documentation.

DK41 - Deferral of planned effort on specific items due to lack of approved user requirements documentation.

0428 - Additional funds reprogramed into project to accelerate development on hardening of shelters in response to increased emphasis on providing protection for critical weapons systems and operating personnel.

UNCLASSIFIED

Program Element: #6.37.26.A
DOD Mission Area: #216 - Land Combat Service Support

Title: Combat Support Equipment
Budget Activity: 14 - Tactical Programs

0471 - Deferral of planned effort due to lack of approved user requirements documentation.

The decrease of \$865 thousand in FY 1981 funding reflects the application of general Congressional reductions.

The net decrease in the FY 1982 funding requirement reflects the combined effects of the following:

DCOL - Increase in funds is required to resolve technical difficulties in time to meet the trilateral (US UK-GE) coordinated schedule for development of an interoperable family of tactical bridging.

DG14 - Reduction of the planned scope of effort.

IK39 - Deferral of planned effort on specific Items due to revised priorities.

DK41 - Decreased funding requirements is due to realigning program to reflect incremental funding policies and deferral of planned effort on specific items due to revised priorities.

0428 - Increased funding requirement to support expanded scope of effort in response to the increased emphasis placed on the project in PY 1980.

D526 - Termination of the project in response to prior Congressional direction to eliminate Army RDTE efforts on waterc-

E. (U) OTHER APPROPRIATION FUNDS: Not Applicable

UNCLASSIFIED "

11-142

. helicated .

Program Element: #6.37.26.A

DOD Mission Area: #216 - Land Combat Service 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 a tribateral (United States, United Kingdom, and Federal Republic of Germany) Memorandum of Understanding and the Steering Committee for Bridging for 1985 and Beyond, the Department of Defense Joint Container Steering Group, the Joint Committee on Tactical Shelter; the Program Advisory Group for Bulk Petroleum Fuels Distribution, 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 Support.
- H. (U) WORK PERFORNED BY: In-house efforts are performed by the US Army Nobility 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; Johns-Manville, Denver, CO; Rexnord Corporation, Milwaukee, WI; Airesearch Manufacturing Company, Phoenix, AZ; Foster-Miller Associates, Incorporated, Waltham, MA; PA Incorporated, Houston TX; General Research Corporation, McLean, VA; Goodyear Aerospace Corporation, Akron, Oll; Arthur D. Little, Inc., Cambridge, MA; ILC Dover, Frederica, DE; Albany International Research Co., Dedham, MA; and Southwest Research Institute, San Antonio, TX.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Year Accomplishments: Technical feasibility testing of components for Bridging for 1985 and Beyond was completed, the results evaluated, and the International Final Concept Team recommended system concepts for Engineering Development. Fabrication of composite structural bridge elements and the design of expedient systems for access to and egress from wet gap crossing sites were initiated. Prototype components for tunnel detection systems were procured. A technology assessment and a cost and operational effectiveness analysis were completed, and the design concept was selected for a depot system to rapidly load ammunition into containers. An assessment of coated-fabric materials and manufacturing technology was completed and two manufacturers initiated fabrication of prototype 5,000-barrel-capacity bulk fuel storage

UNCLASSIFIED

Program Element: #6.37.26.A

DOD Mission Area: #216 - Land Combat Service Support

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

tanks. Continued development of components for low-temperature refueling systems included conducting development rests (DT I) on a bulk fuel transfer pump, initiating design of a fuel dispensing pump and fabrication of prototype hoses, drums, and storage tanks. Fabrication of prototype quick-connect pipeline couplings was initiated. Development of a mechanical pipe-joining system was continued. Design of a flexible hoseline system for short-haul fuel transfer was initiated. A concept design for nuclear hardening of S250 and S280 shelters was completed, and fabrication of prototypes for the Gail and overpressure criteria testing was initiated. Development of kits for complexing the Army family of shelters was initiated.

- 2. (U) FY 1981 Program: Component fabrication and testing of modified girder, ramp, launcher, and transporter components of Bridging for 1985 and Beyond will be continued. Development of lightweight, high-strength bridge structural components will be continued. Development tests will be initiated on prototype access/egtess systems for current brilging. Continued tunnel detection development will include evaluation of selected seismic and soil resistivity analysis techniques and the application of automatic data processing to reduction of field data. A container amountion dunnage system for use with the rapid depot loading system will be developed and tested for compliance with transportation safety regulations. Fabrication of two competitive designs of a 5,000-barrel-capacity coated fabric fuel storage tank will be completed, and development and operational test (DT I/OT I) initiated. A rapidly emplaceable petroleum pipeline system will be procured and tested. Pabrication of a prototype refueling system components will be completed, and system design tests conducted. An experimental model of a unit for field mixing of fire-resistant fuel will be fabricated. A means for interconnecting rigid-wall shelters will be developed, and alternative structural designs will be evaluated. A prototype shelter with electromagnetic and radio frequency interference protection will be fabricated. Low-cost composite panels will be Labricated for evaluation with the family of Army standard shelters.
- 3. (U) FY 1982 Planned Program: Component testing of modified ramps, launcher, and the wheeled transporter for Bridging for 1985 and Beyond will be completed. Evaluation of the initial composite structural bridge members will be completed, and design of additional composite structural members and launch-mechanism components will be initiated. Development and operational tests will be conducted on the access/egress surfacing and placement systems for current bridging and on the egress system for swimming and fording vehicles. Prototype tunneling activity detectors will be procured and tested. The transfer vehicle subsystem for the Prestaged Ammunition Loading System will be designed and fabricated. Advanced Development will be initiated on a system for cooling drinking water in hot-arid climates and a water quality monitor. Operational testing of the 5,000-barrel coated-fabric fuel storage tanks and the rapidly emplaceable pipeline will be completed. Fabrication of development and operational test models will be completed for the flexible hoseline system, low-temperature fuel dispensing systems, and the field mixing and handling equipment for fire-resistant fuels. Kits to provide chemical/biological

UNCLASSIFIED

11-144

i let to a coat of

Program Element: #6.37.26.A DDD Mission Area: #216 - Land Combat Service Support Title: Combat Support Equipment
Budget Activity: 14 - Tactical Programs

agent, nuclear and ballistics protection for tactical shelters will be designed and fabricated. Fabrication of prototype, low-cost composite panels for the Army family of tactical shelters will be completed.

- 4. (U) FY 1983 Planned Program: Development of composite bridge structural and launch mechanism components will be continued. Development and operational tests and evaluation of the access/egress expedient surfacing system for current bridging will be completed. Development of access and egress systems for new bridging systems will be initiated. Advanced Development will be completed on the selsmic, resistivity, and electromagnetic systems for tunnel detection. Exploration of geophysical techniques for deep tunnel detection will be continued. A systems evaluation of the rapid container amountion loading system will be conducted and subsystem interface requirements verified. Advanced Development will be completed on the system for cooling water, the water quality monitor, the flexible petroleum hoseline system, the field blending equipment for fire-resistant fuels, the low-temperature refueling systems, and the large-capacity coated-fabric fuel storage tanks. Design of equipment for detection and rapid development and production of ground water sources will be initiated. Development of alrecycle alreconditioning units and a standard family of systems providing total environmental control will be initiated. Advanced Development of a 50-foot accordian shelter will be conducted. A shelter with nuclear, ballistic, chemical/blological agent protection kits will be fabricated for field evaluation.
- 5. (U) <u>Program to Completion</u>: 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.

FY 1932 RDTE CONCRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 16.37.30.A

DOD Mission Area: 1255 - Tactical Surveillance, Reconnaissance, and Target Acquisition

Title: Tactical Surveillance System
Budget Activity: 14 - Tactical Programs

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

Project Number	Title	FY 1980 <u>Actual</u>	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Totel Estimated Coses
	TOTAL FOR PROGRAM ELEMENT	11720	10933	-	-	Continuing	Not Applicable
D560	Tactical Surveillance System	11720	10933		~	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND HISSION NEED: This program element supports the portion of the Arm'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 enough 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 blumting 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 roun to greatly assist the commander in defeating the enemy.
- C. (U) BASIS FOR FY 1982 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. Begin prototype Tactical magery Exploitation System (TacIES) 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.
- D. BASIS FOR CHANGE BETWEEN FY 1982 and FY 1981 CONGRESSIONAL DESCRIPTIVE SUMMARIES: (\$ in thousands)

11-146

. het to be en !

Program Element: #6.37.30.A

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

Title: Tactical Surveillance System
Budget Activity: 14 - Tactical Programs

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	11720	[0933		Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	11720	11886		Continuing	Not Applicable

- (U) FY 1981 and FY 1982 changes are due to inflation adjustments.
- E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

Program Element: #6.37.30.A

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

Title: Tactical Surveillance System
Budget Activity: 14 - Tactical Programs

- F. (8) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: Data originating from a variety of strategic and tactical surveillance sensus 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 tend y and useful form as to materially influence the land battle. Techniques and equipment which will provide for this tapid 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) HORK PERFORMED BY: RCA Corp., Camden, M.; Aerospace Corp., El Segundo, CA; US Army Electronic Research and Development Command (ERADCOM), Adelphi, MD; Ford Aerospace Corp., Palo Alto, CA; Systems Planning Corp., Arlington, VA; MRJ, Inc., McLean, VA; E-Systems, Inc., Gartand, TX; General Dynamics Corp., San Diego, CA; General Electric Corp., Fing of Prussia, PA; DBA, Inc., Melbourne, FL.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) PY 1980 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 full 1979. Demonstration in a tactical environment (Reforger Exercise) was completed in full 1980. System development for interface with a second collecton system was continued. Advanced development (AD) of subsystems for an advanced exploitation system was continued.
- 2. (U) PY 1981 Program: Modification will begin to allow the DITB system to accept input from a new theater sensor. Correlation of new sensor data with other data will be evaluated. The DITB will be deployed to XVIII Abn Corps, Rt. Brugg, NC, for further operational evaluation. Improved communications and interfaces with the Interim Tactical ELING Processor (ITEP) and all Source Analysis System (ASAS) will be developed. Development of specifications for a prototype Tactical Imagery Exploitation System (FacIES) will begin based on analysis of PY80 demonstration results, PY81 operational evaluations, and competitive concept design studies completed in early PY81.

11-148

i little biett !

Program Element: #6.37.30.A

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

Title: Tactical Surveillance System

Budget Activity: 14 - Tactical Programs

3. (U) FY 1982 Planned Program: Development of prototype TaclES will begin. Software development for tactical exploitation of TR-1 Advanced Synthetic Aperture Radar System (ASARS) data in TACLES will continue in coordination with USAF. The Digital Imagery Test Bed will be used to evaluate operational concepts and techniques developed for TaclES and to evaluate operator-system interfaces. Improved interfaces with the Interim Tactical ELINT processor (ITEP) and emerging All-Source Analysis System (ASAS) will be completed and evaluated. Software development to integrate data from a developing national sensor will begin.

4. (U) FY 1983 Planned Program: The TacIES prototype will be deployed to a 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.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.37.A

DOD Mission Area: #213-Ground Air Defense

Title: Antiradiation Missile Countermeasures (ARM-CM)
Budget Activity: #4 - Tactical Program

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 4540	PY 1981 Estimate 4622	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion Continuing	Total Estimated Costs Not Applicable
				1 1	1 1	_	
5181	Antiradiation Missile Countermeasures	4540	4622	-	•	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEEDS:

This program element provides the broad, nonsystem-specific technology base for the development of countermeasures to the antiradiation missile threat. The program is oriented at developing countermeasures applicable to ground surveillance, counterbattery, and air defense radars, along with special classes of communications terminals. The effort addresses five areas of activity: threat evaluation and simulation; countermeasures development; laboratory simulation and testing; establishment and maintenance of a triservice field test capability; and support of Tri-Service Joint Working Group on Antiradiation Missile Countermeasures (ARM-CM).

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Continue analysis of threat information to provide simulations of enemy systems for the evaluation of ARM-CM effectiveness; update capabilities of generic seeker to emulate enemy systems and initiate reconfiguration of generic seeker to include postulated ARM seeker design responses to present ARM-CM's; provide field test instrumentation, field test support and data reduction for planned field tests of advanced development models of ARM-CM's for

Program Element: 16.37.37.A

DOD Mission Area: 1213-Ground Air Defense

Title: Antiradiation Missile Counterme sures (ARM-CM)
Budget Activity: #4 - Tactical Program

the PATRIOT, FIREFINDER (AN/TPQ-37), and Air Force TPS-43E radars; continue development and test of passive decoy concept and a low-cost modular decoy (MODEC); continue development of postulated continuous wave (CW) ARM systems and development of countermeasures applicable to CW systems; continue analysis of anti-ARM radar technique for application to future radar system design; continue development of mainbeam ARM definition and countermeasures; continue analysis and development of active ARM-CM techniques; provide support to the Tri-Service ARM-CM Working Group and NATO ARM-CM analysis.

Program Element: #6.37.37.A

DOD Mission Area: #213-Ground Air Defense

Title: Antiradiation Missile Countermeasures (ARM-CM)
Budget Activity: 44 - Tactical Program

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4540	4622		Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	5545	4964		Continuing	Not Applicable

Decrease in FY 1980 resulted from reprograming to higher priority programs. Decrease in FY 1981 and FY 1982 is due to budgeting constraints not anticipated in FY 1981.

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

11-152

e liet to divide A

Program Element: #6.37.37.A DOD Mission Area: #213-Ground Air Defense Title: Antiradiation Missile Countermeasures (ARM-CM)
Budget Activity: #4 - Tactical Program

F. DETAILED BACKGROUND AND DESCRIPTION: The Army has fielded and has under development a variety of emitters which are susceptible to attack by location and tracking systems which utilize the radiation of the emitter as a tracking signature. These emitters are

systems are relatively complex and expensive, and serve a critical role for the Army in the field. All are susceptible to enemy antiradiation missile attack in varying degrees. Given their criticality and susceptibility, it is imperative that ARM countermeasures be developed and tested vis-a-vis the known and projected threat. The objectives of this program are to characterize and simulate the known and projected threat missile systems, to develop appropriate countermeasures to provide laboratory and field test instrumentation, and to provide triservice data exchanges.

- G. (U) <u>RELATED ACTIVITIES:</u> Development of antiradiation missile countermeasures is conducted by the three services with the Army being the lead service. The threat data and simulations, countermeasure technology, and field test instrumentation developed within this program are utilized within the specific ARM-CM development activities done in Program Elements 6.43.07.A (PATRIOT), 2.37.31.A (Improved Hawk), 6.43.09.A (ROLAND), and 6.37.29.A (Counterbattery Radar). The Navy has conducted work in Program Element 6.35.16N (Radar Surveillance Equipment), and by the Air Force in 6.39.18F (Electronic Warfare Technology), and 6.37.50F (Counter-Countermeasures Advanced Development). The field test instrumentation and simulations developed under project D181 directly support the Navy and the Air Force work. The three services routinely coordinate their respective service programs via the Tri-Service Joint Working Group on ARM-CM.
- H. (U) WORK PERFORMED BY: The present contractors utilized in accomplishing this program are Computer Science Corporation, Huntsville, Alabama; General Dynamics, Pomona, California; HRB-Singer, State College, Pennsylvania; Brunswick Corporation, Defense Division, Costa Hesa, California; System Planning Corporation, Arlington, Virginia, and Huntsville Alabama; Malibu Research Associates, Inc., Santa Monica, California; Technology Services Corporation, Santa Monica, California and Silver Spring, Maryland; General Electric Corp, Syracuse, New York; Yought Corporation, Dalias, Texas; ESL Inc., Sunnyvale, California; Tektronix, Inc., Beverton, Oregon; Hewlett Packard, Rockville, MD; and System Support Associates, Arlington, VA. The in-house developing organizations responsible for executing the program are Harry Diamond Laboratories, U.S. Army Electronic Research and Development Command (ERADCOM), Adelphi, Maryland; US Army Missile Command (MICOM), Redstone Arsenal, Alabama, Naval Weapons Center (NWC), China Lake, California.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

Program Element: #6.37.37.A

DOD Hission Area: #213-Ground Air Defense

Title: Antiradiation Missile Countermeasure: (ARM-CM)
Budget Activity: #4 - Tactical Program

- 1, (U) FY 1980 and Prior Acc aplishments: In FY78 the generic seeker was developed for laboratory in tramentation; digital simulations of friendly ARM's were completed, and threat ARM simulation was initiated; analysis on the passive decoy concept was started; and the study of hardening techniques was initiated. In FY79 the generic seeker was an ilized in the Radio Prequency Source Simulator at MICOM, and hardware-in-the-loop simulations were performed in support of evaluation of ARM CM techniques for the HAWK and PATRIOT systems. The generic seeker was modified for mounting in the nose of a test aircraft with a realtime computer control to provide a "flyable" generic ARM seeker (FGAS) capability. A fighter aircraft mounted instrumentation pod to be utilized with the FGAS was also developed for future field tests. The study of hardening techniques was completed. Development of threat ARM simulations continued. Feasibility studies of dual-mode (radio frequency-infrared) seeker technology were initiated in late FY79. Analysis of the feasibility of the mainbeam ARM concept continued during FY79. The low-cost modular decoy concept (MODEC) snalysis, specification and tube development was started in late FY79. In FY80 the FGAS was integrated in an A-3 aircraft with the instrumentation pod and utilized in a HAWK ARM-CM field test in the third quarter of FY80. The feasibility analysis of the passive decoy concept was completed and breadboard hardware design started. Analysis of anti-ARM redar techniques for future radar design was initiated. Analysis of CM ARM homing methods and CM techniques against CM ARM's was started. Feasibility analysis of the main beam ARM concept and dual-mode seeker technology continued. Field test measurements relative to analysis of active ARM-CM techniques were made. Support in ARI, dif analysis to NATO and support of the Tri-Service ARM-CM Morking Group continued.
- 2. (U) FY 1981 Program: The flyable generic ARM seeker (FGAS) will be modified to improve its performance and provide additional discriminants relative to projected ARM seeker design. The FGAS with its instrumented aircraft (II) provide field test support for ARM-CM tests of PATRIOT, FIREFINDER (AN/TPQ-37) and the Air Force TSP-438 in the third and loarth quarter FY81. Threat ARM simulation development for use in ARM-CM effectiveness analysis will continue. The low-out modular decay (MODEC) prototype hardware should be completed in the third quarter of FY81, and field tests to evaluate the hirdware will be conducted. Passive decay breadboard hardware design and tesing will continue. Analysis of anti-ARM radar techniques for future radar design will continue. Analysis of CW ARM homing methods and development of CM techniques against CW ARM's will continue. Analysis of the main beam ARM concept and dual-mode seeker technology as well as possible counter as surres against these projected threats will continue. Field test measurements relative to analysis of active ARM-CM techniques will continue, and some analysis on the feasibility of an anti-ARM missile system will be started. Modest efforts on determining the threat of a remotely piloted vehicle-ARM (RPV/ARM) combination will be initiated. Support of ARM-CM analysis for LAED and the Tri-Service ARM-CM Working Group will be continued.
 - 3. (U) FY 1982 Planned Programs: The FGAS with its instrumented alreraft will provide field test support for the Marine

11-154

e dette bie is

Program Element: #6.37.37.A

DOD Mission Area: #213-Ground Air Defense

Title: Antiradiation Missile Countermeasures (ARM-CM)
Budget Activity: #4 - Tactical Program

TTS-59 radar in the second quarter of FY82. Threat ARM simulation will continue. The brassboard hardware of the low-cost modular decoy will be initiated and should be completed by the end of FY82 or early FY83. Passive decoy brassboard hardware will be initiated. Analysis of anti-ARM radar techniques for future radar design will be completed. CW countermeasure development will be initiated as well as countermeasures development for the projected threats of main beam ARM and the dual-mode ARM. Analysis of the anti-ARM missile system concept will be completed. A feasibility analysis of a high-energy radio frequency kill concept will be initiated. An assessment of the impact of advanced ARM threats including main beam ARM's, dual-mode ARM's and RPV ARM's will be started. The design and construction of an Advanced Generic seeker and support instrumentation as a test instrument to emulate projected threats will be initiated. Support for NATO and the Tri-Service ARM-CM Working Group will be continued.

- 4. (U) FY 1983 Planned Program: Threat ARM simulation will continue. The Advanced Generic seeker and support instrumentation will be completed and tested. Test support for new ARM-CM techniques will be provided. The low-cost modular decoy and passive decoy brassboard hardware will be completed and evaluated. Support for NATO and the Tri-Service ARM-CM Working Group will be continued.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.40.A DOD Mission Area: #213 - Ground Air Defense Title: Division Air Defense Command and Control (SHORAD-02 System)
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 3000	FY 1981 Estimate 14085	PY 1982 Estimate 13378	FY 1983 Estimate 12562	Additional to Completion 16092	Total Estimated Cost 59117
D593	Short-Range Air Defense Command and Control (SHORAD-C System)	3000	14085	13378	12562	16092	59117

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Short-range air defense (SHORAD) command and control is provided thru three major elements: A sensor to provide aircraft position data, command and controlling information provided 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 effectiveness. When considering the improved short-range air defense weapon capabilities coupled with increased capability of threat aircraft, the present command and control system does not support the force commander's requirement to manage air defense. The shortfalls in the flow of air battle information results in allow, 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 alseed upportunities 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, improve dissemination of air threat warning and weapon control orders, the introduction of additional instrumentation to allow timely and accurate presentation of appropriate battle information at the gunner position, and expanded communication support. Initially, in an effort to support the earliest practical deployment of a viable command and control system that fulfills a near-term requirement, the use of already-developed hardware is

11-156

. ILLE STOR !

Program Element: #6.37.40.A

DOD Mission Area: #213 - Ground Air Defense

Title: Division Air Defense Command and Control (SHORAD-C2 System)
Budger Activity: 44 - Tactical Programs

C. (U) BASIS FOR 1982 RDTE REQUEST: The requested funds will continue the effort begun in PY80, including formal DT/OT activity scheduled to start in 4th Qtr FY81. Requested funds are needed for operation, modification and support of test hardware and software, collection and analysis of test data, system engineering, program management, development of an integrated logistics support package and engineering development of sensor. Available PY81 SHORAD C funds will also be used for sensor engineering development.

engineering development.		
Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission 1/
Initiate System Design 1/	2080	2Q79
Concept Feasibility 1/ Demonstration	1981	4Q80
Sensor Decision 2/	2Q81	-
Complete System Besign 1/	3081	2Q80
Start DT/OT I	4Q81	-
ASARC I (changed from Validation IPR)	2082	1981
Testbed, Upgraded System 4/	none	4Q83
Validation ASARC, Upgraded System 4	none	4Q83

¹ SIIORAD C² Program funds were used to initiate system design in FY80, not FY79. The design will be completed after the Concept Feasibility Demonstration (CFD). The CFD was delayed pending the acquisition of a sensor capable of producing the required data.

UNCLASSIFIED

 $[\]frac{2}{d}$ A General Officer Panel will convene to select the most suitable (for acquisition and/or modification) sensor to support deployment.

Program Element: #6.37.40.A

DOD Mission Area: #213 - Ground Air Defense

Title: <u>Division Air Defense Command and Control (SHORAD-C. System)</u>
Budget Activity: #4 - Tactical Programs

- $\bar{\mathbf{j}}$ ASARC I was changed to accommodate the need to modify a sensor to support the testing.
- 4 The program for the "Upgraded System" has not been completely formulated and approved.

UNCLASSIFIED

11-158

.

Program Element: #6.37.40.A

DOD Mission Area: #211 - Ground Air Defense

Title: Division Air Defense Command and Control (SHORAD-C2 System)
Budget Activity: #4 - Tactical Programs

D. (U) COMPARISON WITH FY81 RDTE Request: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	3000	14085	13378	28654	59117
Funds (as shown in FY 1981 submission)	3000	15583	17112	26286	61981

D593 - The difference in funding for PY81 and PY82 represents reduced requirements for sensor modification because of the delay in the selection of a sensor for SHORAD command and control. That selection should be made in 2081. As a result of the delay, some funds that were to be used in PY81 will be carried to 1082, thereby reducing FY82 funding requirements.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army						
Funds (current requirements)	0	0	0	33674	64959	98633
Funds (as shown in FY 1981				,		
submission)		•		13370 1'	281430	294800
Quantities (current requirements	1)				20	20
Quantities (as shown in FY 1981						
submission)					20	20

1/ - The FY81 submission did include procurement funds for an "Upgraded System." Since a program for an "Upgraded System" has not been completely formulated and approved, the procurement funding requirement has been reduced accordingly.

UNCLASSIFIED

Program Element: #6.37.40.A DOD Mission Area: #213 - Ground Air 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 extrectiveness of SHORAD systems by providing precise and timely target information, including tentative target identification, to the SHORAD gumner. This will allow the gunner more time for positive visual identification, and allow engagement of (argets in the forward aspect mode of, then, newly acquired weapons. That is, the gunner's effectiveness in selecting only hostile targets for earliest possible engagement will be enhanced because he will be able to identify and engage targets before the This function, called "cueing," will be performed by acquiring target data from a senso: (radar), and transmitting that data to SHORAD gunners via a digital data link over the Army's current VHF radios. The architecture for the cueing system will be determined by the Concept Feasibility Demonstration planned to start in 1QFY81. 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 more accurately determine target direction (within 10 degrees in azimuth) than is possible with the currently deployed system. The SHORAD C System will also provide an improved interface between the SHORAD battalion and a ngarby HAWK or Patriot battalion. This improved interface will be used to provide the second majo: function of the SHORAD C system, called "alerting." Alerting is described as warning all friendly ground forces of impending air air ick so that those forces may take protective/defensive measures. This interface will be implemented by extracting information from the AN/TSQ-73 fire distribution system at the HAMK battalion or from the Patriot Command/Control Set, transmitting that information by HP radios directly to several locations simultaneously in the SHORAD battalion, including the battalion: liaison offices at the manuever units. Alerting information can be transmitted to the lower echelons by using FM radio nots within the manuever units. The use of HF radios will greatly expedite this alerting information by eliminating 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. When the HP and VHF radios are replaced in the late 1980's, the SHORAD C system (both cueing and alerting) will be supported by the PLPS/JTIDS (Position Locating and Reporting System/Joint Tactical Information Distribution System) Hybrid. The sensor to be used for initial operational deployments of the cucing capability will be selected by a General 1. This sensor will be selected based upon several criteria, including availability, cost of modifications and/or addi I sensors, and growth potential to meet the changing threat through the 1980's. This General Officer Finel should also a ct efforts to assure timely availability of a follow-on sensor in the 1980's.

HINCLASSIFIED

A . 13

Program Element: #6.37.40.A

DOD Mission Area: #213 - Ground Air Defense

Title: Division Air Defense Command and Control (SHORAD-C2 System)
Budget Activity: #4 - Tactical Programs

G. (U) RELATED ACTIVITIES:

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.A
Stinger	6,43.06.A
FAAR	2,77.30.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 FERFORMED BY: Program management will be performed by the Project Manager, Air Defense Command and Control Systems (ADCCS), assigned to the US Army Missile Command (MICOM), Redstone Arsenal, Alabama. Contracted efforts will be performed by competitively selected contractors, except in the case of nondevelopmental hardware, in which case, hardware and any necessary modifications will be acquired through the office currently responsible for that hardware. New software and test support unique to the SHORAD C² System, but for nondevelopmental hardware, may be acquired directly from the prime contractor for that hardware on a sole-source basis.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 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 resulted in conclusions 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 \$600 thousand from program element 6.27.01.A, Project M92, 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 envolve 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 hirdware and software were acquired to initiate a Concept Feasibility Demonstration.

UNCLASSIFIED

Program Element: #6.37.40.A

DOD Mission Area: #213 - Ground Air Defense

Title: Division Air Defense Command and Control (SHORAD C2 System)
Budget Activity: 14 - Tactical Programs

- 2. (U) FY 1981 Program: The Concept Feasibility Demonstration (CFD) will demonstrate various architecture for Cucing and for Alerting. A Sensor Selection Panel will decide which sensor is most suitable for acquisition and/or modification to support the Cucing effort. Start of DT/OT I for Cucing is dependent upon which sensor is selected.
- 3. (U) FY 1982 Planned Program: Acquisition and/or modification of a sensor to support SHORAD C² function will begin. The schedule for testing and/or technological base needs is dependent upon the sensor decision, but all necessary experimental work will be performed and the proposed system will be ready for full-scale development prior to proceeding with procurement of hardware and software for DT/OT.
- 4. (U) FY 1983 Planned Program: DT/OT II and III for the Cueing capability will be initiated, depending upon availability of the selected sensor. For the Alerting capability, all necessary experimental work will have been performed and the proposed system will be ready for full-scale development.
- 5. (U) Program to Completion: Depending upon which sensor is selected for the Gueing capability, production of hardware is expected to support initial deployments in FY85 or later. The alerting capability should be ready for initial deployments in FY86.

UNCLASSIFIED

11-162

grafet Michaelle 4

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.45.A

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

Title: Tactical Electronic Support Heasure: Systems
Budget Activity: 14 - Tactical Programs

RESOURCES (PROJECT LISTING): (\$ in thousands) ۸.

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 15030	FY 1981 Estimate 12576	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
	QUARITTIES						Not Applicable
D9 07	Tactical Electronic Surveillance Systems	10781	9955	_ ~		Continuing	Not Applicable
D925	Tactical Electronic Warfare and Intelligence Command	4249	2621	~	•	Continuing	Not Applicable

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program encompasses the Army's Tactical Exploitation of National Capabilities (TENCAP) initiatives and Tactical Electronic Warfare/Intelligence (EW/I) Command and Control Systems for use by Division, Corps, and echelon above Corps commanders. 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 strategic intelligence collection interfaces with tactical operations and the development of an automated management, control, analysis, data reduction, and reporting system for generation of timely and effective combat intelligence and electronic warfare information and control of EW/L assets. Program Element: #6.37.45.A

DOD Mission Are: #255 - Tactical Surveillance,

Title: Tactical Electronic Support Measures Systems
Budget Activity: #4 - Tactical Programs Reconnaisance, & Target Acquisition

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

1. (U) Pending the Army program modifications based on implementation of the Joint Tactical Fusion Plan, complete dynacel development of the SIGINT/EW subsystem (SEMS) of the All-Source Analysis System (ASAS). A Corps-level prototype module with attendant softwire will continue to be fabricated. Hardware and software will be evaluated.

- 2. (U) Continue investigation of applications to exploit strategic sensor programs.
- COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Escharted Cont
RDFE Funds (current requirements)	15030	12576		Continuing	Noc Applicable
Punds (as shown in FY 1981 submission)	15119	12756		Continuing	Nor Applicable

The decrease in FY81 is due to a general Congressional Reduction. The increase shown in FY 1982 is due to additional advanced development efforts required to refine, stabilize, and finalize software design and code, and conduct verification testing of the advanced model of the ASAS/SEMS (Project D925).

E. (U) THER APPROPRIATION FUNDS: (\$ In thousands): Not Applicable.

11-164

a desti die il b

Program Element: #6.37.45.A

DOD Mission Area: #255 - Tack

Title: Tactical Electronic Support Measures Systems
Budget Activity: 14 - Tactical Programs

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

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is to establish the technical feasibility and military potential of projects being developed in two functional areas: tactical electronic surveillance (D907), and tactical electronic wirfare intelligence (BWI) command and control (D925). All items are non-Signals intelligence (SIGINT)/Intelligence-Related Activities (IRA). Project D907 includes the development of equipment and systems which collect, process, and disseminate intelligence/information from a variety of strategic and tactical electronic surveillance sensors to locate and identify enemy units, activity, and targets. Project D925 encompasses development of automated, contralized tactical facilities for analysis, integration, and reporting of the collection from, and man nement of, all the Army's tactical intelligence and electronic warfare (EW) resources, as well as integrating data from uniformal, joint, and allied sensor systems.
- G. (U) <u>RELATED ACTIVITIES</u>: Related developments are conducted by the Air Force, Navy, and NSA. Coordination is effected by the exchange of technical reports, attendance at scientific 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 Service of Defense (Under Secretary for Research and Engineering).
- H. (U) WORK PERFORMED BY: The major contractors for the two projects are: Aerospace Corp. El Segundo, CA; GTE Sylvania, Mountain View, CA; TRW, Incorporated, Redondo Beach, CA; and RCA Corporation, Burlington, MA. In house developing organizations are: US Army Electronics Research and Development Command (ERADCOM), Adelphi, MD; US Army Communications Research and Development Command, Fort Monmouth, NJ; Project Manager, All-Source Analysis System, Vint Hill Farms, Warrenton, VA; US Army Electronic Warfire Laboratory, Fort Monmouth, NJ; and US Army Material Development and Readiness Communications (DARCOM).

Ġ

Program Element: #6.37.45.A

DDD Mission Area: #255 - Tactical Surveillance,

Title: Tactical Electronic Support Measures Systems
Budget Activity: 4 - Tactical Programs

Reconnaisance, & Target Acquisition

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments:

a. (U) <u>D907</u> - 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 operation levaluation and limited operational capability.

b. (U) <u>D925</u> - Advanced Development of the Signal Intelligence/Electronic Warfare (SIGINT/EW) subsystem (part of the Ail-Source Analysis System (ASAS)) and prototype fabrication was initiated. Development is scheduled to continue in advanced development through 1982 because of the necessity to structure the control and processing systems in consonance with the technologies derived from of the Battlefield Exploitation and Target Acquisition (BETA) program and the Technical Control and Analysis Center (Division) (TCAC(D)) (see PE/Project 6.43.21.4/D926-Ail-Source Analysis System.

2. (U) PY 1981 Program:

a. (U) $\underline{0907}$ - Continue development and improvement of strategic sensor interfaces to enhance tactival utility. Continue ITEP operational evaluation.

b. (U) <u>D925</u> - Advanced Development of the ASAS SIGINT/EW module will continue. The hardware will be integrated into tactical shelters, and computer software will be designed and coded, and testing will begin. The TCAC(O) software package will be delivered to the government and tested. The Joint Tactical Fusion Program (JTPP) will be initiated which may revise this strategy. However, as of the date of this summary, specific modifications have not been defined.

1. (U) FY 1982 Planned Program:

a. (U) D907 - Deploy additional ITEP systems. Continue joint programs to enhance tactical utility of strategic systems.

b. The JTFP should be fully implemented, and a joint program strategy initiated. Pending any program modifications, advanced development of the ASAS/SEWS will be completed. Hardware and software will be evaluated and accepted from the contractor. DT/OT I will be conducted.

11-166

in belieben bei beit beiter bei

Program Element: #6.37.45.A

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

Title: Tactical Electronic Support Measures Systems
Budget Activity: 44 - Tactical Programs

4. (U) FY 1983 Planned Program:

- a. (U) <u>D907</u> Continue analysis of strategic sensors and advanced development of strategic interfaces.
- b. (U) <u>D925</u> Complete DT/OT I of ASAS/SEWS. Initiate development of flat-panel display and interactive color graphic terminal.
- 5. (U) Program to Completion: This is a continuing program. Development under this element will normally be transferred to engineering development, Program Element, 6.47.45.A, Tactical Electronic Surveillance Systems, and Program Element 6.43.21.A, or Joint Tactical Fusion Program.

FY 1932 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #0907

Progrum Element: #6.37.45.A

DDD Mission Area: #255 - Tactical Surveillance,
Reconnaisance and Target Acquisition

Title: Tactical Electronic Surveillance System Title: Tactical Electronic Support Measures systems
Budget Activity: 14 - Tactical Programs

- A. (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 unit;, activity, and targets representing a general tactical threat. The systems developed will be the primary source of intelligence on enems second-echelon forces. Data originating from a variety of strategic and tactical electronic surveillance sensors must be transmitted to tactical echelon 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 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.
- B. (U) RELATED ACTIVITIES: Technological developments designed to shorten the time required to collect and discussionate information are related to this development. These areas include automated search procedures, data link technologies, tarstical identification and positioning, and data reduction/filtering. The potential of satellite communications is being considered. This work is coordinated with the appropriate offices at the national level to avoid duplication of effort.
- C. (U) WORK PERFORMED BY: Aerospace Corporation, El Segundo, CA; US Army Electronics Research and Development Command (ERADCOM), Adelphi, HD; US Army Communications Research and Development Command, Fort Monmouth, NJ; MRJ Inc., Fairfax, VA.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Studies were completed which provide the technical basis for the equipment, techniques, systems development and interface definition with three strategic systems and four theater/tactical systems. Advanced development work was initiated on one strategic electronic surveillance system to make it more responsive to tactical commanders' needs. System design was completed for 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. Both ITEP's are performing well and are providing excellent support to Army Corps.

11-168

a hardware at 3

Project: #0907

Program Element: #6.37.45.A

Out Mission Acea: #255 - Tactical Surveillance, Reconnaisance and Target Acquisition

Title: Tactical Electronic Surveillance System Title: Tactical Electronic Support Measures Systems
Budget Activity: 14 - Tactical Programs

- 2. (U) FY 1931 Program: Continue development and improvement of strategic sensor interfaces to enhance tactical utility and reduce communications requirements. Continue Interim Tactical ELINT Processor (ITEP) operational evaluation and develop improved software to enhance tactical support capability of deployed ITEP's based on these evaluations. Develop improved communications and interfaces with the Digital Imagery Test Bed (DITB), the emerging All-Source Analysis System (ASAS), and the prototype Tactical Imagery Exploitation System (Tacles).
- 1. (II) FY 1932 Planned Program: Continue advanced development work on joint programs to enhance tactical utility of strategic sensors. Continue development of communications and interfaces between ITEP, prototype Tacles, and ASAS. Perform technical analysis of potential utility of developing strategic sensors.
- 4. (II) FY 1933 Planned Program: Based on ITEP experience and strategic systems advanced configuration, initiate design for fully operational Tactical ELINT Processor (TEP) to be developed in consonance with the future strategic ELINT sensor mix and the ASAS. Continue analysis of developing strategic sensors with the objective of enhancing tactical utility early in the program.
 - 5. (U) Program to Completion: This is a continuing program.
 - 6. (II) Major Milestones: Not applicable.
 - 1. Resources (3 in thousands):

RUFE	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	10781	9955			Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	10781	10159		-	Continuing	Not Applicable

(0) The reduction in FY81 was due to Congressional authorization reduction. The increase in FY82 is due to inflation ad lustment .

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # D925

Title: Tactical Blectronic Warfare Intelligence

Command and Control Systems

Program Element: #6.37.45.A

Title: Tactical Electronic Support

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

A. (U) DETAILED BACKGROUND AND DESCRIPTION:

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 yeapons for effective enemy attrition. This project provides for the advanced development of

the All Source Analysis System (ASAS),

- 2. (U) Based on summer 1980 Congressional guidance to redirect the BBTA project, the Services have submitted a Joint Tactical Fusion Plan (JTFP) to the Office of the Secretary of Defense (OSD). This plan describes a program for the joint development and acquisition of a tactical correlation/fusion capability for the Services and includes the current ASAS and BETA projects. The proposed objective is to acquire service systems at the earliest possible date in a joint program which ensures interoperability within and among services. The program will:
 - a. (U) Provide an automated capability to support joint air/ground combat operations in near-realtime.
- b. (U) Make maximum use of the investment in the Battlefield Exploitation and Target Acquisition (BETA) project by incorporating it into development of the Army's All Source Analysis System (ASAS), the Air Force's Automated factical Fusion Division (ATFD), and into theater fixed facilities, as appropriate.
- c. (U) Provide the ASAS the required Sensitive Compartmented Information (SCI) capability by maturing and incor porating the Army's Quick Reaction Capability (QRC) Technical Control and Analysis Center (Division) (TCAC(D) and ASAS/Signals Intelligence (SIGINT) BW Subsystem (SEWS) Advanced Development Model (ADM) into ASAS.

11-170

CHEMBINE !

Project: # D925

Title: Tactical Electronic Warfare Intelligence

Program Element: #6.37.45.A

Command and Control Systems
Title: Tactical Electronic Support

DOD Mission Area: #255 - Tactical Surveillance,

Measures System

Budget Activity: 44 - Tactical Programs

Reconnaissance, and Target Acquisition

d. (U) Use an incremental approach to development and procurement to minimize cost and duplication to the extent allowed by operational necessity and service-unique requirements.

- e. (1) Use Command and Control (C2) architectures defined by the Services.
- f. (11) Comply with Congressional direction, Department of Defense Directives and other applicable guidance.
- 3. (U) The Joint Tactical Fusion Plan (JTFP), approved by the Office of the Secretary of Defense on 5 December 1980, will be the conceptual framework from which to evolve a Program Manager Charter, a program development plan, and a system acquisition strategy. These programmatic documents will be completed by June 1981. Therefore, strategies portrayed in this descriptive summary (and project D926, PE 6.43.21.A) are subject to modification as the Army develops its revised programs.
- B. (U) RELATED ACTIVITIES: Related developments are conducted by the Air Force, Navy, and NSA although these efforts will be redefined upon implementation of the Joint Tactical Fusion Program. Current coordination is effected by the exchange of technical reports, attendance at scientific meetings and conferences, joint participation on subgroups and working panels. In addition, formal requirements documents of each service are exchanged, reviewed, and commented upon by other services. Coordination is also accomplish a part of the program reviews conducted by the Office of the Secretary of Defense (Under Secretary for Research and Eng. ing). The following Air Force/Navy/NSA PE's apply: 6.43.21.A and 6.43.21.F, Joint Tactical Fusion System; 6.47.10.1, Reconnaissance Electronic Warfare Equipment; 6.37.55.A. Tactical Electronic Countermeasures, and 3.56.85.G, Tactical Cryptologic Program. There is no unnecessary duplication of effort among services and agencies.
- C. (U) MORK PERFORMED BY: The major contractor for the current advanced development effort of the All Source Analysis System is RCA Corporation, Burlington, MA. In-house developing organizations are: US Army Electronics Research and Development Command (ERADCOM), Adelphi, MD; Project Manager, All Source Analysis System, Vint Hill Farms, Warrenton, VA; US Army Electronic Marfare Laboratory, Fort Monmouth, NJ; and US Army Materiel Development and Readiness Command (DARCOM) Alexandria, VA.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

UNCLASSIFIED

Project: # 8925

Title: Tactical Electronic Warfare Intelligence

Command and Control Systems

Program Element: #6.37.45.4

Title: Tactical Electronic Support

Mea.ures System

Budget Activity: #4 - Tactical Programs

DOD Mission Area: #255 - Tactical Surveillance,

Reconnaissance, and Target Acquisition

1. (U) FY 1980 and Prior Accomplishments: Advanced development of the Signal Intelligence/Electronic Verface sub-/stem (SEWS) of the All Source Analysis System (ASAS) and prototype fabrication were initiated. Effort consists of development of one Corps-level, 5-shelter prototype model. Development is currently scheduled to continue in Advanced New Copement (AO) into FY 1982; however, this strategy may be revised based on the Joint Tactical Fusion Programs. (See PE/P to ject 6.43.21.A/D926-Joint Tactical Fusion Program).

- 2. (U) FY 1981 Program: The ASAS/SEWS will continue in advanced development. The hardware will be integrated into tactical shelters, and computer software will be designed, coded, and testing will begin. The TCAC(D) soft have package will be delivered to the government and tested. The Joint Tactical Fusion Program (JTFP) will be initiated which may revise the strategy described above. However, as of the date of this summary, specific modifications have not been de ined.
- 3. (U) FY 1982 Planned Program: The JTPP should be fully implemented with a joint program strategy and development plan. Pending any program modifications, advanced development of the ASAS/SEWS will be completed. Hardwar and software will be evaluated and accepted from the contractor. DT 1/OT I will be conducted. The TCAC(D) will be deployed. (See Project 0926, para. Dl.)
- 4. (U) FY 1983 Planned Program: Pending any JTPP modifications, DT I/OT I of the ASAS/SEWS will be completed. A large, single-color, flat-panel display product improvement will be initiated to support the evolutionary design of the ASAS. The ASAS/SEWS AND software is utilized as operational software in the TCAC(D), a Quick Reaction Capability (QRC) system procured for the European Divisions and one CONUS unit with FY 1979 OPA dollars. Evolutionary software improvements, based upon field generated requirements, will continue to be developed and integrated into the ASAS.
- (U) Program to Completion: Software improvements will continue. A multicolor flat-panel display and a video disc PIP will be initiated. These components will be integral to the ASAS and are required to support the evolution of the ASAS from the 1970's computer technology into the very large-scale integrated circuit (VLSI) technology of the 1980's.
- 6. (U) Major Milestones: Not applicable at this time. Will be prescribed based on Joint Tactical Furton Plan Acquisition strategy and official designation of the ASAS as a major system.

UNCLASSIFIED

11:172

for the whole is

Project: # D925

Title: Tactical Electronic Warfare Intelligence
Command and Control Systems
Title: Tactical Electronic Support

Program Element: #6.37.45.A

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

Measures System

Budget Activity: 44 - Tactical Programs

Resources: (\$ In thousands)

2000	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements)	4249	2621			Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4245	2597		Not Shown	Continuing	Not Applicable

Quantities: Not applicable.

Other Appropriations: Not applicable.

The funding level differences in FY 1980 and 1981 are attributable to minor budgetary adjustments. \$5000 thousand increase shown in FY 1982 is due to additional advanced development efforts required to refine, stabilize, and finalize software design and code and conduct verification testing of the advanced development model of the ASAS/SEWS.

DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/6 5/1 DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT TEST & EVALUA--ETC(U) AD-A101 306 JAN 81 UNCLASSIFIED NL 3 ∾ 6

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.37.46.A

DOD Mission Area: #256 - Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCCARS)
Budger Activity: #4 - Tactical Programs

A. (U) RESOURCES (Project Listing): (\$ in thousands)

Project Number	Title	FY80 Actual	FY81 Estimate	FY82 Estimate	FY83 Estimate	Additional To Completio	Total Cost Estimated
	TOTAL FOR PROGRAM ELEMENT	20475	15714	15526	9135	1000	76695
D555	Single Channel Ground and Airborne Radio	20475	15714	15526	9135	1000	76695

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 platons. 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 codio system to operate in an electronic countermeasure (ECM) environment. Technique being validated is frequency hopping (EIM).

C. (U) BASIS FOR FY 1982 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 Siecrable Null Antenna Processor (SNAP II), the Vehicular Intercom System, and Audio Transducers (earphones, microphones, louispeakers) which will interface with the SINCGARS-V radio.

11-174

There was a

Program Element: #6.37.46.A
DOD Mission Area: #256 - Tactical Communications

Title: Single Channel Ground and Airborne Rollo System (SINCGARS)
Budget Activity: #4 - Tactical Programs

SINCGARS-V Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY81 Submission
Advanced Development (AD) Contract Award	APR 78	APR 78
Development Test/Operational Test (DT/OT) Completion	JUN 82	FEB 82
Army Systems Acquisition Review Council/Defense Systems Acquisition		
Review Council II	NOV 82	HAY 82
Engineering Development (ED)	DEC 82	JUL 82
DT/OT Completed	NOV 84	JUL 84
ASARC/DSARC III	MAR 85	NOV 84

Change in milestone dates (SINCGARS-V only) was directly attributable to the incorporation of a specification change into the contracts. The change clarified and amplified requirements.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	20475	15714	15526	10135	76695
Funds (as shown in FY 1981 submission)	18476	_ 15587	6698	8100	69278

UNCLASSIFIED

Program Element: #6.37.46.A

DOD Mission Area: #256 - Tactical Communications

Title: Single Channel Ground and Airborne Radio : /:iem (SINCGARS)
Budget Activity: #4 - Tactical Programs

Increase in FY80 represents funds reprogramed into the program for a change in the specification to all three competitive contracts and cost growths on all three competitive contracts. The increase in FY81 is attributable to the incorporation of a modification to the Integrated Logistics Support Package to all three competitive contracts. The increase in FY82 is attributable to anticipated award of advanced development contracts for the Steerable Null Antenna Processor (SBAP II), the Vehicular Intercom System (VIS), and the Audio Transducers.

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

UNCLASSIFIED

11-176

1 444 A WOLL S

Program Element: #6.17.46.A
DOD Mission Area: #256 - Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCGARS)
Budget Activity: 14 - 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 program has the following key development goals: (1) modularity with maximum commonality of components in the various configurations; (2) capability of operating with an add-on communication Security (COMSEC) and Electronic Counter-Countermeasure (BCCM) modules; (3) interoperability with combat net radios of NATO alites; and (4) capability of operating in a nuclear environment (Defense Nuclear Agency participation). There is extensive participation in the program by the Air Force, Navy, and Harine Corps. SINCGARS-V is being designed to either replace Air Force, Navy, and Harine Corps close air support VIF 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 facinite. The following ancillary devices are included in the program: (1) Vehicular Intercom System: This intercom system will replace the AN/VIC-1. Techniques and objectives being explored are: (a) improved operational functions and capabilities, (b) improved reliability and durability, (c) improved installation and maintenance, and (d) improved COMSEC. (2) Transducers: New transducers are being developed that 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) extend the audio bandwidth.
- G. (U) <u>RELATED ACTIVITIES</u>: 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.
- II. (U) <u>MORK PERFORMED BY:</u> Contractors are: Cincinnati Electronics Corp, Cincinnati, OII; ITT Aeronautical/Optical Division, Ft Wayne, IN; and Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, IA. 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).

I. (U) PROGRAM ACCOMPLISHMENTS AND PUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: The Major System Requirements Specifications (MSRS) was approved by the Department of the Army, in April 1980 on SINCGARS-V. Cost/Schedule Control Systems Criteria (C/SCSC) redemonstration reviews were held at Cincinnati and ITT. Engineering Design Tests (EDT) were initiated at the contractors' facilities. Cost growth proposals were received from all three contractors. NATO began participating in the Test Integration Working Groups (TIWG) under the terms of the Memorandum of Understanding (MOU) signed in December 1979. Three design study and material investigation contracts were completed on the Transducer program.

UNCLASSIFIED

Program Element: #6.37.46.A

DOD Mission Area: #256 - Tactical Communications

Title: Single Channel Ground and Airborne Radio System (SINCGARS)
Budget Activity: #4 - Tactical Programs

- 2. (U) FY 1981 Program: Finalize and validate Cincinnati and ITT to the C/SCSC procedures. Approval of an updated Baseline Cost Estimate (BCE) will be accomplished. An MOU with Germany will be finalized after comparative testing of Electronic Counter-Countermeasure (ECCM) Techniques. Completion of EDT will be accomplished. Final design reviews will be conducted. Advanced Development Verification Testing (ADVT) will be initiated. Proposals will be evaluated in preparation for Advanced Development (AD) contract awards on the Vehicular Intercom and Transducer programs.
- 3. (U) FY 1982 Planned Program: Funds requested are required for the Development and Operational Testing of SINCGARS-V. Continue funding three competitive contractors; continue to monitor contracts and provide engineering support; develop Technical Data Package for the next phase of the program; proposals will be evaluated and contracts awarded for Advanced Development models of the new Vehicular Intercom System and the Transducer models to support the SINCGARS-V.
- 4. (U) FY 1983 Planned Program: Milestone II will be held to approve decision on next phase of program. Engineering Development (ED) contract will be awarded on SINCGARS-V; monitor and provide engineering support to Vehicular Intercom and Transducer AD contracts.
- 5. (U) Program to Completion: This project is continued in program element 6.47.51.A, SINCGARS Engineering Development, Project Number D282.

UNCLASSIFIED

11-178

a daude das U.A.

UNCLASSIFIED FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.37.46.A

tle: Single Channel Ground and Airborne Radio
Subsystem (SINCGARS)
Budget Activity: 44 - Tactical Program

DOD Mission Area: / 256 - Tactical Communications

J. (U) Test and Evaluation Data:

1. (U) Development Test and Evaluation.

- a. (II) Developmental 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, the Advanced development equipment models will be tested to evaluate the rechnical performance versus requirement of the specification.
- (i) There are three prototype development contractors: Rockwell International (Collins), Cedar Rapids, Iowa; Cincinnati Biectronics, Cincinnati, Ohio, and ITT Aerospace/Optical Division, Ft. Wayne, Indiana. The US Army Test and Evaluation Command (TECOM) is the agency responsible for the conduct of development tests. For test and evaluation support TECOM 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 major test facility to be utilized in the conduct of DT I is the Army Electronic Proving Ground (AEPG) at Ft. Harchuca, Artgona. Army civilian and military personnel will be used to conduct these tests. Contractor test facilities and personnel will be used to conduct these tests.
 - d. (U) The schedule for developmental testing (DT I) is:

(1) (U) EDT (Draft Plan) January 1980 (U) Jul 80-Feb 81* (2) (3) (U) Final Design Review April 1981* January 1981 Jun-Nov 1981* (4) (U) ADVT (Draft Plan) (0) ADVI (Contractor)

(6) (11) LEMP July 1981

* Milestones

e. (U) Each contractor will provide 10 receiver-transmitters in the following configurations for DT 1:

UNCLASSIFIED

Program Element: 6.37.46.A

Single Channel Ground and Airborne Radio

DOD Mission Area: # 256 - Tactical Communications

Subsystem (SINCGARS)

Budget Activity: 14 - Tactical Program

- (II) Two (2) Mannack
- (U) Two (2) Vehicular (shore-range)
- (3) (U) Two (2) Vehicular (long-range)
- (4) (U) Two (2) Vehicular with additional receiver-only capability
- (5) (U) Two (2) Alteraft
- (6) (U) In addition, sixteen (16) Security Modules and Electronic Countercounter Modules will be active ed for test during DT 1. Ancillary devices such as Securable Remote Control units and ECCM fill devices will also be available for test.
 - f. (U) In addition to the Army, SINCGARS-V will be utilized by the Navy, Marines and Air Force.
 - g. (U) EDT is presently being conducted.
- h. (U) 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 I/OT I, each contractor will be required to conduct a Prototype Reliability Qualification Test (PRGT), a Maintenance Teardown and Evaluation, and a Maintainability Demonstration. The PRGT 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 during these tests will be military personnel with appropriate MOS.
 - i. (U) Environmental testing will be conducted in accordance with MIL-STD-81 OC.
 - 2. (U) Operational Test and Evaluation:
- a. (U) Operational Testing (OT) of SINCGARS-V will be conducted between December 1981 and June 1982. 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.

UNCLASSIFIED

11-180

A BOOK STANK !

Program Element: 6.37.46.A

UNCLASSIFIED

Title: Single Channel Ground and Airborne Radio
Subsystem (SINCGARS)

teations

Budget Activity: 14 - Tactical Program

DOD Mission Area: # 256 - Tactical Communications

- c. (U) All subsystems and support equipment needed for test are on schedule.
- d. (U) There are three prototype development contractors: Rockwell International (Collins), Cedar Rapids, Iowa; Cincinnati Electronics, Cincinnati, Ohio, and ITT Aerospace/Optical, Ft Wayne, Indiana. Operational Test and Evaluation Agency (OTEA) is the Army agency responsible for the conduct of Operational Tests. There are no other planned independent operational tests.
- (U) Fr Polk, LA, has been selected as the test site for OT I. OT I will be conducted by a Mechanized Infantry Brigade. Of is designed to test all contractor configurations concurrently and will be tested against the requirements in the Test Evaluation Master Plan (TEMP).
 - f. (U) The schedule for operational testing is:

 - (1) (U) OT (Draft Plan) June 1981 (2) (U) OT December 1981 June 1982 (Major Milestones)
 - (3) (U) TEMP July 1981
 - g. (U) Each contractor will provide the following configurations for OT I:
 - (1) (U) Four (4) manpack
 - (U) Six (6) vehicular (short-range)
- (2) (U) Twelve (12) vehicular (long-range)
 (4) (U) Four (4) vehicular with additional receiver-only capability
 (5) (U) Six (6) aircraft
 (6) (U) Thirty-nine (39) COMSEC and 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 I/OT I each contractor will be required to conduct a Prototype Reliability Qualification Test (PRQT), a Maintenance Teardown and Evaluation, and a Maintainability Demonstration.

UNCLASSIFIED

Program Element: 6.37.46.A

UNCLASSIFIED

Title: Single Channel Ground and Airborne Radii
Subsystem (SINCGARS)
Budget Activity: 4 - Tactical Program

DOD Mission Area: 1 256 - Tactical Communications

j. (U) OT is scheduled to be completed prior to the program's budget year major production contract award. No operational testing has been initiated on SINCGARS-V.

Operational Technical Characteristics FREQUENCY RANGE NUTBER OF CHANNELS CHANNEL SPACING VOICE COMMUNICATIONS RANGE	30-88 MHz 2320 25 kHz		ECCM PROCESSING GAIN CHANNEL BANDWIDTH	The estable 2 5 70B 2 5 KHZ
MANPACK	8 km			
VEHICULAR	35 km			
AIRCRAFT	35 km			
DIGITAL TRANSMISSION (DATA) RANGE (BIL	Error Rate .1	8/S)		
TACFIRE DATA	17 km			
ALL OTHER DATA	17 km			
MANPACK	4.5 km			
VEHTCULAR	17.5 km			
PHYSICAL DETECTABLLITY				
MANPACK	200 meters			
VEHICULAR	500 meters			
MITR		·	DEMONSTRATED TECHNICAL (DETERMINED.	MARACTERISTICS TO BE
ORGANIZATIONAL	15 m.in			
DIRECT SUPPORT	45 min			
GENERAL SUPPORT	2.5 hrs			
MTBF		_		
MANPACK	1300 hrs			
VEHICULAR	1250 hrs	WHOLA COLUMN		
ATRBORNE	750 hrs	UNCLASSIFIED		
11-182				

a distribution of the A

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 16.37.55.A

DOD Mission Area: 1257 - Electronic Warfare & Counter C-1

Budget Activity: 14 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 9859	FY 1981 Estimate 8867	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion Continuing	Total Estimated Cost Not Applicable
DK 1 2	Communications Electronic			1 1	F 1		
	Countermeasures Systems	4954	5553	1		Continuing	Not Applicable
DK L 3	Non Communications Electronic	:		1 1	1 1		
	Countermeasures Systems	2605	2856	1	1	Continuing	Not Applicable
DK 1 4	Expendable Jammers	0	0	•		Continuing	Not Applicable
D251	Protective Electronic			1 1	ş ş		
	Warfare Equipment	2300	458			Continuing	Not Applicable

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to provide for validation/advanced development of factical electronic countermeasures (ECM) equipment and systems to assist the tactical Army (Brigade, Division, and Corps) commander in denying, destroying, disrupting, and deceiving hostile command and control communications and radars associated with weapons systems, maneuver forces, and other threats of immediate value to the commander. Overcoming current equipment deficiencies

tance 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.

C. BASIS FOR FY 1982 RDTE REQUEST: FY 1982 funds are required to support: development of automatic test equipment applications software for the Tactical Ground-based Communications JAMMER (TACJAM) and the heliborne

Program Element: 46.37.55.A

DOD Mission Area: 1257 - Electronic Warfare & Counter C-1

Budget Activity: 14 - Tactical Programs

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

ALVED .	FY 1980	FY 1981	PY 1982	Additional To Completion	Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1981	9859 8734	8867 9399		Continuing Continuing	Not Applicable Not Applicable

Increase in PY 1980 of \$1125 thousand is due to an increase of \$1450 thousand in Project DK 13 as the result of an increased requirement for software effort in interrelating control and analysis centers with ECM systems, and reprograming to higher priority requirements of \$325 thousand from Project D251.

Decrease in FY 1981 reflects the application of general Congressional reductions.

Decrease in FY 1982 attributable to alignment of funds to higher priority requirements.

OTHER APPROPRIATION FUNDS: (\$ in thousands)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army*:			٠.			. 1
Funds (current requirements)	21400	62700	•	•		
Funds (as shown in FY 1981	21400	60800	1			
subulsaton)			1 (i i	j i	1 1
Quantities (current regulrements)	11	25				
				ل ا	ر	L 1

11-184

a distanted !

Program Element: #6.37.55.A

DOD Mission Are:: #257 - Electronic Warfare & Counter C-1

Budget Activity: #4 - Tactical Programs

Quantities (as shown in FY 1981	FY 1980 Actual	FY 1981 Estimate 23	FY 1982 Estimate	FY 1983 Estimate Not Shown	Additional To Completion	Total Estimated Cost
submission)						

*Funds/quantities shown are for TACJAM (Project DK 12). Difference of two systems between FY81 quantities is based on contract reduced costs. FY82 has an increase of three systems. Funds were adjusted in FY 1981 and FY 1982 for quantity increases and inflation. Difference in cost to completion is due to inflation.

Marie Co Day and the second	FY 1980 Actual	FY 1981 Estimate	PY 1982 Estimate	FY 1983 Estimate		itional Completion	Es	tal timated st
Afreraft Procurement, Army**:								_
Funds (current requirements)	σ	Ø						
Funds (as shown in FY 1981	18900	5400		Not Shown				
submission)			1 1		ı	ŀ	1	ı
Quantities (current requirements)	0	0			ŗ	•		
Quantities (as shown in FY 1931	5	0		Not Shown				
submission)					_	-	<u>_</u>	

**Funds/quantitles shown are for QUICK FIX/BLACK HAWK (UH-60A) aircraft (Project DK 12). Changes in funding and quantities are to reflect BLACK HAWK production. Previous funding contained funds to modify EH-1H/X to QUICK FIX configuration. The current funding for this MOD is as follows: FY80 - \$16,000; FY81 - \$5,600; FY82 - \$2,700.

Program Element: 16.37.55.A

DOD Mission Area: 1257 - Electronic Warfare & Counter 64 Budget Activity: 14 - Tactical Programs

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 deay and/or degrade hostile forces use of their communications, noncommunications, infrared, and optical battleffeld surveillance devices. Equipment developed includes ground-vehicular-mounted and airborne ECM systems. Developments include Heliborne Communications Jamming System (QUICK FIX); Tactical Army Communications Jamming System (

varning devices as self-protection measures for tactical vehicles and installations; and countermeasures

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.F, 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 a complished 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, Sanden, NJ.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. FY 1980 and Prior Accomplishments: Studied techniques of enemy intitank guided missile (ATCM). Electronic countermeasures (ECM) for ATCM were field tested. The heliborne communications intercept and jamming system QUICK FIX was developed, tested, type classified standard A, and a production contract awarded. In addition, a program to optimize the communications

11-186

a dicheminal i

.

Program Element: #6.37.55.A

DOD Mission Area: #257 - Electronic Warfare & Counter C-1

Budget Activity: #4 - Tactical Programs

receivers was completed. Development and Operational Testing, standard type classification, and award of procurement contract for the Tactical Army Communications Jammer (TACJAM) were accomplished. Procurement of applications software for TACJAM and QUICK FIX automatic test equipment continued. System validation leading toward the development of a family of very rugged and rapidly erectable antenna systems for use with communications and noncommunications jammers was completed. A program to develop optimized communications was begun. Advanced Development for a series of expendable elec-

tronic countermeasures (ECM) devices

wis Initiated.

2. For 1981 Program: Efforts initiated in prior years will continue. Development of Automatic Test Equipment (ATE) software for TACIAM and QUICK FIX will continue. System validation leading toward the development of a family of very rugged and rapidly exectable antenna systems (tactical antenna masts and assemblies) for use with communications and noncommunications Jammers will be completed and tested. A program to optimize communications

will be completed, and a developmental product improvement program to apply the results to deployed and developmental jammers will be initiated. Advanced development of expendible jammers will continue. Development of warning devices for self-protection electronic warfare will continue.

- 3. FY 1982 Planned Program: Efforts initiated in prior years will continue. Automatic test equipment (ATE) applications software for TACJAM and QUICK FIX will continue. Development of expendable jammers will be continued, and development testing will be initiated. Development of an Air Defense Electronic Warfare System (ADEWS) will begin. Development of jamming systems countermeasures will begin.
- 4. FY 1983 Planned Program: Efforts initiated in prior years will continue; these include the development of a family of expendable Jammers, development of jammers, and development of an Air Defense Electronic Warfare System. Automatic test equipment applications software for TACJAM and QUICK FIX will be completed. Development of Electronic Warfare devices for self-protection will be reinitiated.

Program Element: #6.37.55.A

DOD Mission Area: #257 - Electronic Warfare & Counter C-1 Budget Activity: #4 - Tactical Programs

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

11-188

The Wallace

FY 1982 RDTE CÓNGRESSIONAL DESCRIPTIVE SUMMARY

Project: #DK12
Program Element: #6.37.55.A
DOD Mission Area: #257 - Electronic Warfare and Counter-C3[

Title: Communications Electronic Countermeasures Systems Title: Tactical Electronic Countermeasures Systems

Budget Activity: 14 - Tactical Programs

DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is to establish the technical feasibility and military potential of tactical communications electronic countermeasures (ECM) equipment and systems to assist the tactical Arm) (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,

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. Noncommunications and expendable jammer development have been moved to Project DKI3 and DKI4 respectively for this program element for FY82 and outyears.

- 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) WORK 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.

Project: #DK12
Program Element: #6.37.55.A

DOD Mission Area: #257 - Electronic Warfare
and Counter-C3[

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

D. (U) PROGRAM ACCOMPLISIMENTS AND PUTURE PROGRAMS:

- eveloped, tested, and three Quick Reaction Capability (QRC) models were deployed. Development of this system into a capability to meet total Division and Brigade requirements is proceeding in accordance with developmental product improvemental. 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 Buey helicopter (EH-IX) was awarded. A ground-based tactical communications jammer the AN/MLQ-34 (TACJAM), has been developed, tested, type classified standard A, and a production contract awarded. This system is mounted in an armored shelter on a tracked vehicle, featuring rapid mobility, very fast setup/teardown, and high-performance, computer-controlled multisignal jamming. 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; for example, the PATRIOT Missile system and several tactical communications systems. Development of a series of expendable jamming devices capable of disrupting hostile tactical
- 2. FY 1981 Program: Support to procurement of the TACJAM and QUICK FIX will continue. Development of applications software to allow intermediate maintenance to be performed at common automatic test system facilities for TACJAM and QUICK FIX will continue. Prototype development of various types of expendable jammers will continue. Development of the family of very rugged and rapidly erectable (sixty-to-ninety seconds) antenna systems (tactical antenna masts and assemblies) for use with communications and noncommunications jammers will be completed and tested. Procure ent of the antenna masts will be accomplished with the procurement of the using systems; that is, TACJAM, TRAILBLAZKR, IATRIOT Missiles, Communications Systems, and others. FY81 begins developmental product improvements to TACJAM to add a capability, taking the lower frequency range from

 This program will be started to add the capability to TACJAM to effectively jam

 3.18 and 3.18
- 3. FY 1982 Planned Program: Efforts initiated in prior years will continue. Development of Automatic Test Equipment (ATE) software for TACJAM and QUICK PIX will continue. Upgrade of the QUICK PIX systems will continue to improve

11-190

(2,0)

1 40 % RIVER

Project: IDK12
Program Element: 16.37.55.A
DOD Mission Area: 1257 - Electronic Warfare

and Counter-C3I

Title: Communications Electronic Countermeasures Systems Title: Tactical Blectronic Countermeasures Systems
Budget Activity: 14 - Tactical Programu

jamming and direction-finding by development of a antenna for use on a helicopter which will take advantage of the accuracy. The TACJAM developmental product improvement program will continue with the capability of the current system upgrade, plus the starting of a program to increase the capability of through software modifications without significant equipment changes.

4. FY 1983 Planned Program. Efforts initiated in prior years will continue. Automatic test equipment applications software for TACJAM and QUICK FIX will be completed. The developmental product improvements to TACJAM

continue. QUICK FIX jamming and direction-finding improvements will continue. A program to perform nuclear weapons effects
assessments on TACJAM and QUICK PIX will start.

- 5. (U) Program to Completion: This is a continuing program.
- 6. (C) Major Hilestones:

Milestone Dates Current Shown in FY 1981 Submission 1 Qrr FY 1978 Milestone Dates Major Milestones Task Name AN/ALQ-151, QUICK FIX AN/MLQ-34, TACJAM Type Classification 1 Qtr FY 1978 Type Classification 3 Qtr FY 1979 3 Qtr FY 1979 _ BCH 2 Qtr FY 1981 Not Shown AD Start

Slippage of two months in AN/MLQ-34 type classification was due to administrative delays in approving results of development acceptance in-process review (DEVA IPR).

Project: #DK12
Program Element: #6.37.55.A
DOD Mission Area: #257 - Electronic Warfare and Counter-C31

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

Resources (\$ in thousands):

	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE Funds (current requirements)	4954	5553	ı	_	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	4954	5959		Not Shown	Continuing	Not Applicable

Quantities: Not Applicable

Decrease in FY 1981 attributable to the application of Congressional general reductions.

Decrease of \$7379 thousand in FY 1982 is due to restructuring of the overall program element by moving expendable jammers and noncommunications jammers to Project DK14 and DK13 respectively and internal budget adjustments for higher priority Army projects.

Other Procurement, Army***			
Funds (current requirements)	21400	62700	
Funds (as shown in PY 1981 submission)	21400	60800	Not Shown
Other Appropriations:			
Quantities (current requiremen	ts) 11	25	1
Quantities (as shown in FY 198	ı		•
submission)	11	23	Not Shown

***Funds/quantities shown are for TACJAM. (See Descriptive Summary for Program Element 6.37.55.A.) FY 1981 has an increase of two systems based on contract reduced costs. FY 1982 has an increase of three systems. Funds were adjusted in FY 1981 for inflation and FY 1982 for quantity increase and inflation.

14-192.

a dicheminal !

Project: #DK12
Program Element: #6.37.55.A
DOD Mission Area: #257 - Electronic Warfare and Counter-C31

Alteraft Procurement, Army****
Punds (current requirements) 0 0
Funds (as shown in FY 1981 submission) 18900 5400 Not Shown

Quantities (current requirements 0 0
Quantities (as shown in FY 1981 submission) 5 0 Not Shown

****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. Previous funding contained funds to modify EH-1H/X to QUICK FIX configuration. The current funding for this MOD is as follows: FY80-\$16000, FY81-\$5600, and FY82-\$2700.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: # DK14

Title: Expendable Jammers

Program Element: # 6.37.55.A

Title: Tactical Electronic Counterneasures Systems
Budget: 14 - Tactical Programs

DOD Mission Area: \$257-Electronic Warfare and Counter Command, Control, Communications, and Intelligence

DETAILED BACKGROUND AND DESCRIPTION: This project funds the advanced development of a series of expendable elec-A. DETAILED BACKGROUND AND DESCRIPTION: This project funds the advanced development of a series of expendable electronic warfare (EW) 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: 1 - 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 airborne 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 jam types with

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

The tasks included in the expendable jammer (EXJAM) project are expendable Ed, howing antiradiation sensor (Howerum) system, Remotely Piloted Vehicles (RPV) EW payload, and microwave/communications expendable jammers.

RELATED ACTIVITIES: During FY 1980 an internal laboratory infrared (ILIR) program entitled "Remote Control of Expendable Jammers Using Spread Spectrum Techniques" was performed under Program Element 6.11.01A, Project Number 11.161101A91A. The objective of this in-house effort was to assess the feasibility of

Experimental remote control links utilizing matched pairs of surface wave devices were breadboarded and successfully tested within the laboratory. The results of this program have been used as the basis for an PY 1981 program entitled "Expendable Jammer Techniques" being performed under Program Blement 6.27.15A. Project 62715A042. Effort will result in a sufficient quantity of remote control links to permit determination of the

The tasks currently being performed under this project 63755DK14 were previously funded under program elements 6.27.55.D251 (Protective Electronic Warfare Equipment) and 6.37.55.DK12 (Communications Electronic Countermeasures). The US Army Electronic Research and Development Command (ERADCOM) Project Officer has been assigned expendable electronic countermeasures (ECM) (jamming) devices. Among his responsibilities is monitoring Army and other services exp.:ndable ECM device programs in order to preclude any possibility of a duplication of effort within the Army or the Department of Defense.

Project: # DK14 Program Elemt: # 6.37.55.A Title: Expendable Jammers
Title: Tactical Electron

Tactical Electronic Countermeasures Systems

Budget: #4 - Tactical Programs

#257-Electronic Warfare and Counter Command, Control, Communications, and Intelligence

C. (U) WORK 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, Nashui, Nil 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 Smitt Set-On and 'Horowave EXJAM; US Army Electronics Research and Development Command - Signal Warfare Laboratory (SWL), Warrenton, VA, for the Artillery-Delivered Barrage EXJAM; and US Army Electronics Research and Development Command - HD Laboratory (HDL), Adelphi, MD, for the Artillery-Delivered Barrage EXJAM.

PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

FY 1980 and Prior Accomplishments: In FY76 US Army Electronics Research And Development Command (ERADCOM) initiated the development of the scan lock-on and barrage hand-emplaced communications jammers. These jammers were completed in FY/7 and an operational feasibility test conducted. The conclusions from the test indicated that expendable jummer (EXIAH) devices can be expected to

Based on the FY78 results, an accelerated development for the very high frequency (VHF) artillery-delivered barrage Jammer was initiated. Principal efforts in the initial stages of this effort were concerned with battery life, automatic antenna erection, and deployment dispersion. These efforts have resulted in a planned procurement of a lithium reserve battery, development of new composite material antennas and the verification of appropriate deployment of EXIAM devices. Also in FY78, 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 (FADAR) expendable jammer was also built and tested in FY78. Tests proved the feasibility of using a microwave expendable jammer (EXJAM) against specified threats. Contracts were awarded in FY80 for the advanced development of a VIF attillery-delivered barrage device and a microwave device.

FY 1981 Program: Those efforts started in FY80 for and a microwave EXJAM will continue through FY81. During FY81, designs will be finalized and approved and initial prototypes will be delivered for government evaluation. Development of a scan lock-on EXJAM will begin in second quarter FY81. In house test and evaluation of existing communications EXJAM devices will continue. Artillery EXJAM dispersion techniques will complete field testing. Prototype development of the homing antiradiation drone system, Homerun, will begla.

Project: # DK14
Program Element: # 6.37.55.A

pect: # DK14

Title: Expendable Jammers

Togram Element: # 6.37.55.A

DOD Hission Area: # 1557-Electronic Warfare and Counter Command, Budget: # 4 - Tactical Programs

Control, Communications, and Intelligence

- FY 1982 Planned Program: Fabrication and documentation for the advanced development (AD) artillery-delivered barrage and scan lock-on EXJAM and the microwave EXJAM will be completed. The development test/operational test (DT/OT) if 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-acale development. Also, development of a for the Homerun program will be initiated.
- 4. (y) PY 1983 Planned Program: Development of an atrborne platform carried and seeded barrage and scan lock-on communications EXJAH will begin. The artillery-delivered EXJAH will transition to engineering development. Advanced development of the Homerun system will continue through FY83.
- Program to Completion: Continue advanced development of the airborne platform barrage and scan lock-on EXJAM programs.

Start improvement programs for com-

munications and microwave EXJAM devices in FY84.

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

RDTE	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	PY 1983 Estimate	Addition.:1	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1981		0	' 4			
submission	Not Shown		-			

11~196

a distribution of the

Project: # DK14
Program Eleat: # 6.37.55.A Title: Expendable Jammers

DOD Mission Area: #257-Electronic Warfare and Counter Command, Control, Communications, and Intelligence Expendable Jammers

Title: Expendable Jammers

Title: Expendable Jammers

Budget: #4 - Tactical Programs

This is the first time a Congressional Descriptive Summary was submitted for expendable jammers.

Other Appropriations: Not Applicable.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 16.42.02.A
DOD Mission Area: 1212 - Fire Support

Title: Aircraft Weapons
Budger Activity: 14 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 6403	FY 1981 Estimate 5130	FY 1982 Estimate 3568	FY 1983 Estimate 729	Additional to Completion 1517	Estal Estanted Cost 501nJ
DL62	Alreraft Rocket Subsystems	4153	4286	2939	729	1517	29203
D133	Aircraft Gun-Type Weapons	2250	844	629	0	0	20 960

- B. (II) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program is needed to support the development and test of larproved aircraft weapon subsystems, excluding missites. The program is necessary in order to support the confinding requirement for low-cost, reliable, easily maintainable, lightweight, increasingly effective armament subsystems of obvanced 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 armament capability on attack helicopters.
- C. (U) BASIS FOR FY 1991 RDTE REQUEST: Basic rocket trajectory data will be acquired for integration in air caft fire controls. Environmental and afforate induced parameters affecting rocket trajectory will be defined. Evaluation of several factors not currently incorporated in the trajectory equation will be initiated. These equations must be defined to overcome deficiencies in delivering rockets accurately. Trajectory constants for the different rocket motor/war and combinations will be developed and refined. Fire control computer information necessary to produce the read-only trajectory data cards which will be required for future production aircrift and for upgrading the fire control computers of fielder attract, and the data necessary to upgrade the Rocket Management System data cards will be developed. Recommended change: 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) amountation 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.
- D. (U) COMPARISON WITH FY 1981 ROTE REQUEST: (\$ 10 thousands)

UNCLASSIFIED

11-198

a det bestelle de l'

Program Element: #6.42.02.A DOD Mission Area: #212 - Fire Support Title: <u>Aircraft Weapons</u>
Budget Activity: <u>#4 - Tactical Programs</u>

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
Funds (corrent requirements)	6403	5130	3568	2246	50163
Funds (as shown in FY 1981 submission)	5243	5511	4970	1890	50431

The FY 1980 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 1981 decrease reflects the application of general Congressional reductions. The overall decrease in FY 1982 results from a decrease in the 2.75-inch Rocket Development Program due to higher priority Army requirements.

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

UNCLASSIFIED

HINCLASSIFIED

Program Element: 46.42.02.A
DOD Mission Area: 4212 - Fire Support

Title: Aircraft Weapons
Budget Activity: 14 - Tactical Programs

- F. (0) DETAILED BACKGROUND AND DESCRIPTION: This program supports the development of new gun and rocket seapons 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, materiel, 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 system. 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 rockets. The Dama ammunition element provides a lethal combat round with both shape charge and high-explosive capability for use by the Attack Helicopter (AAH) and the US Marine Corps Harrier. This ammunition will be interoperable in NATO Gun Systems.
- G. (U) RELATED ACTIVITIES: Close liaison 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-Non-tear Ordinance, an organization chartered at the major field command level. This group provides a medium for exchange of two initial 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 6.42.07.A, Advanced Actack Helicopter; 6.42.12.A, COBRA/TOW; 6.32.06.A, Aircraft Weapons; and 6.22.01.A, Aircraft Weapons Technology.
- II. (U) <u>MORK PERFORMED BY</u>: Contractors: Hughes Aircraft Company, Canoga Park, CA; Norris Industries, Los Angeles, CA; Hercules Incorporated, Radford, VA; Hi-Line Plastics, Incorporated, Olathe, KS; Cosin Industries, Sheboygan, UI; Hughes Helicopters, Culver City, CA; Honeywell Incorporated, Minneapolis, MN; and seven other contractors or prospective bidders accounting for (\$1,765,000) of the effort. In-house organizations: US Army Aviation Research and Development Command, St. Louis, MO; US Army Armament Research and Development Command, Dover, NJ; US Army Missile Research and Development Command, Huntsville, AI; Naval Ordnance Station, Indian Head, MD; Lake City Ammunition Plant, Lake City, MD; Project Manager, Advanced Attack Helicopter, St. Louis, MO, Project Manager, COBRA/TOM, St. Louis, MO.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Initiated development of: new family of 2.75-inch rocket cacheads with remote set fuzing capability; a training practice, high-explosive, dual-purpose 30mm amountion round, interoperable in the NATO 30mm guns, for attack helicopters. Completed development of the 2.75-inch Lightweight Rocket Launcher for attack

UNCLASSIFIED

11~200

3 250 Sept 5 4 5

Program Element: #6.42.02.A
DOD Mission Area: #212 - Fire Support

Title: Alrcraft Weapons
Budget Activity: #4 - Tactical Programs

helicopters. This Lightweight Rocket Launcher will be compatible with the new Remote Settable Fuze on the 2.75° Rocket Systems. Completed development of the 30mm High-Explosive Incendiary Ammunition (XM799) for the USMC for use in Marrier Aircraft. Resolved problems associated with the High-Explosive Dual-Purpose (HEDP) Ámmunition in bore explosions which ailowed the Army to move to qualification testing of the ammunition.

- 2. (U) FY 1981 Program: The multipurpose submunition warhead (XM261) and improved rocket motor continue development. Static, ejection, fragmentation, and armor penetration tests will be conducted on submunitions. Fuzes and balluce assemblies will be wind tunnel and flight tested. The MK66 rocket motor with the XM261 and MI51 warheads will be wind tunnel tested. DT/OT II test will be completed and Type Classification of the XM261 with the new MK66 rocket motor will be initiated.
- 3. (U) FY 1982 Planned Program: The type classification of the improved rocket motor will be completed. The technical data package will be updated, and the effort transferred for production procurement during FY83. Basic rocket trajectory data for the multipurpose submunition warhead will be acquired for integration into the AHIS 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.
- 4. (U) FY 1983 Planned Program: Refinement of the multipurpose submunition rocket trajectory data for the warhead, improved rocket motor and AHIS combination will be initiated. Production actions will be initiated pending availability of funds.
- 5. (U) Program to Completion: Full engineering development efforts will be reestablished for illumination and smoke warheads and are scheduled to complete development in FY 1986.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.04.A

DOD Mission Area: #261 - Airlift

Title: Air Mobility Support Equipment
Budget Activity: #4 - Tactical Programs

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

							Total
Project		FY 1980	FY 1981	FY 1982	FY 1983	Additional	Eat Louised
Number	Title	Actual	Estimate	Batimate	Estimate	To Completion	Costs
	TOTAL FOR PROGRAM ELEMENT	250	1187	3064	3958	Continuing	Not Applicable
DC 32	Ground Support Equipment	0	O	1345	2096	Continuing	Not Applicable
DC33	Cargo Handling Equipment	0	651	939	1061	Continuing	Not applicable
DC45	Aviation Life Support						
	Swa toma	250	536	780	801	Continuing	Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program develops from of equipment, excluding alreraft, that support the Army air mobility requirement. The program leads to the production of from which enhance the car; a handling operations and crew survivability for aircraft or which facilitate the maintenance of the aircraft fleet. To words enough air defense systems, Army aircraft must fly at low levels, when operating near the Forward Edge of the Battle Area (FEBA). Special Electronic Mission Aircraft (SEMA) maintain a standoff distance from the FEBA to avoid enough air defense systems and must operate at higher airtrude for mission accomplishment. These operating conditions demand improved aircraft subsystems and components to enhance the efficiency, safety, and survivability of air crewmembers operating in a hostile environment. New and improved ground support, cargo handling and aviation life support equipment is required to minimize aircraft turnaround times and to maximize efficient operations and maintenance, especially in forward battle areas. The optimizing of the cargo capabilities for the cargo and utility helicopters will result in reduced airframe requirements, operating costs, and manpower requirements for given cargo requirements.

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

(U) Ground Support Equipment: Initiate Engineering Development of: a Small Portable Analyzer Diagnostic Equipment (SPADE) to diagnose the condition of helicopter drive train bearings during ground run-up; a highly mobile, lightweight turbine-powered Aviation Ground Power Unit (AGPU) capable of providing all electric, hydraulic, and pneumatic ground servicing requirements of the Army's current and developmental aircraft systems; a mobile, self-contained, high-pressure Aviation

UNCLASSIFIED

Program Element: #6.42.04.A DOD Mission črea: #261 - Airlift Titte: <u>Air Mobility Support Equipment</u> Budget Activity: <u>#4 - Tactical Programs</u>

Decontamination, De-Iding, and Cleaning System (ADDCS) for rapid decontamination/cleaning of the external surfaces of Army afficialt; and AVMM Ron-Divisional Shop Sets, to be mounted in International Standards Organization-sized shelters, to replace current sets which are mounted in obsolete vans.

(0) Cargo-Handling Equipment: Complete procurement of prototypes of an external container system for cargo (Cargo Relicopter External Lift System) for Development Test 11/Operational Test 11. Award contracts for additional helicopter Internal Cargo-Handling Systems (ICHS) prototypes for Development Test 11/Operational Test 11 with the CH-47.

(0) Aviation Life Support Equipment: Complete development of a Flotation Kit for helicopter aircrewmen. Initiate engineering development of an Emergency Locator Transmitter (ELT). Conduct Development Test 11/Operational Test 11 for two different oxygen systems. A helicopter (bottled) oxygen system will provide oxygen to aircrewmen during search and rescue missions and high-altitude training. The RV-LD/RU-21 Special Electronic Mission Aircraft (SEMA) will be equipped with an integral oxygen system (On-Board Oxygen Generating System) which generates and filters oxygen when operating at high altitudes and/or in chemical agent environments.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
luproved Lighting System for Army Aircraft (ILSAA) Complete DT/OT II	*	:'Y 1981
Inflatable Body and Head Restraints System (IBAHRS) Initiate Engineering Development	FY 1982	Not Shown

*The Improved Fighting System for Army Aircraft (H.SAA) is now a nondevelopmental item. It is being incorporated into applicable aircraft improvement programs. All program funding is based on validated acquisition cost estimates contained in approved or draft requirements documents.

UNCLASSIFIED

Program Element: #6.42.04.A

DOD Mission Area: #261 - Airlift

Title: Air Mobility Support Equipment
Budget Activity: 14 - Tactical Programs

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

RDTE	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1981	250	1187	3064	Continuing	Not Applicable
subalssion)	450	1230	1653	Continuing	Not Applicable

The \$200 thousand reduction in FY 1980 and the \$43 thousand reduction in FY 1981 resulted from the diversion of funds to other higher priority Army programs. The increase of \$1411 thousand in FY 1982 is necessary to meet new development efforts in the Ground Support Equipment project. This project was not funded in previous years (FY 1980 and FY 1981). The new Ground Support initiative for aircraft includes the development of a new ground power unit, an aircraft decontamination unit, a nondivisional shop set (intermediate level of maintenance), and a portable diagnostic set.

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

UNCLASSIFIED

11-204

1. Hadamira A. A.

Program Element: #6.42.04.A
DOD Mission Ares: #261 - Airlift

Title: Air Mobility Support Equipment
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This ongoing program is a composite of Ground Support Equipment, Cargo-Handling Equipment, and Aviation Life Support Equipment. Engineering development of ground support equipment is to develop equipment and procedures applicable to the servicing and maintenance of Army aircraft. The cargo-handling projects are to develop slings, nets, and devices to optimize the rapid movement by helicopter of equipment and supplies to and within forward areas. Development of aviation life support equipment will continue to enhance the overall sufety and survivability of Army aircrevmen.
- G. (U) RELATED ACTIVITIES: Program Elements 6.32.09.A, Air-Mobility Support; 6.22.09, Aeronautical Technology; and 6.22.10.A, Airdrop Technology, in coordination with Joint Technical Coordinating Group (Air Force Program Elements 6.42.28.F, Tactical Airlift Modernization; and 4.11.18, C-141 Stretch Modification); and NATO Standardization agreements. US Army Materiel Development and Readiness Command/US Army Training and Doctrine Command (DARCOM/TRADOC) Life Support Steering Council. 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.
- H. (U) WORK PERFORMED BY: H. Koch and Sons, Anaheim, CA; Boeing-Vertol, Ridley Park, PA; Sikoraky 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.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1980 and Prior Accomplishments: Cargo-Handling Equipment: A high-performance helicopter rescue holst has been procured and fielded to meet an urgent requirement stated by the Surgeon General for Medical Evacuation units. Aviation Life Support Equipment: A vacuum-packed flotation kit for helicopter crewmembers and passengers was procured and submitted to formal Army DT/OT II. The development cost of this kit has been reduced by using an adaptation of a US Air Force standard life raft.
- 2. (U) FY 1981 Program: Cargo-Handling Equipment: Engineering development of an external helicopter lift system (Container Helicopter External Lift System) will be initiated based on the satisfactory completion of validation testing of the Container Lift Adapter and an 8x8x20-foot Helicopter External Gondola System (HEGS-10). Aviation Life Support Equipment: Complete the Development Test/Operation Test II of Helicopter Flotation Kit. Award a development contract for an oxygen system for use in the UH-2, OH-58, CH-47, and EH-60 to allow these aircraft to fly, in accordance with Army regulations, at altitudes over 10,000 feet. An On-Board Oxygen Generating System (OBOGS) will also enter engineering development to support high-altitude missions of the RV-ID/RU-21 aircraft.

UNCLASSIFIED

Program Element: #6.42.04.A DOD Mission Area: #261 - Airlift Title: Air Mobility Support Equipment
Budget Activity: 14 - Tactical Programs

- 3. (U) FY 1982 Planned Programs:
- (U) Ground Support Equipment (GSE): Engineering development of the following end items will be initiated: Small Portable Analyzer Diagnostic Equipment (SPADE), Aviation Ground Power Unit (AGPU), Aircraft Decontaminating De-Icing and Cleaning System (ADDCS), and Aviation Intermediate Maintenance, Non-Divisional Shop Set.
- (U) <u>Cargo-Handling Equipment (CHE)</u>: Acquisition of Cargo Helicopter External Load System (CHELS) hardware and test support packages for Development Test/Operation Test II will be initiated. Engineering development of an Internal Cargo-Handling System (ICHS) for the CH-47 will be initiated with the procurement of additional prototype hardware and necessary test support packages for Development Test/Operational Test II (DT/OT II).
- (U) Aviation Life Support Equipment: The Helicopter Flotation Kit will be type classified standard. The Development Test/Operation Test II of the Helicopter Oxygen System will continue. Development Test/Operation Test II of the On-Board Oxygen-Generating System installed in the RU-21/RU-ID aircraft will be initiated. Engineering development will be initiated on an Emergency Locator Transmitter (ELT). All necessary experimental work for the above items will be performed, and these items will be ready for full-acale development.
- 4. (U) FY 1983 Planned Program: Ground Support Equipment: Acquisition of Aviation Ground Power Unit (AGPU), Small Portable Analyzer Diagnostic Equipment (SPADE), Aviation Decontaminating De-Icing and Cleaning System (ADDCS), and Aviation Intermediate Maintenance (AVIM) Shop Set prototypes and test support packages will continue. Cargo-Handlin: Equipment: Development Test/Operational Test II will be initiated for the Container Helicopter: External Lift System (CG-6.5).

 Acquisition of prototype Internal Cargo-Handling System (ICHS) for the CH-47 will be continued and initiated for the UH-60. Engineering development will be initiated on the 8x8x10-foot Helicopter External Gondola System (HEGS-10) and on a helicopter external cargo sling system constructed with advanced technology materiels. Aviation Life Support Equipment: The helicopter On-Board Oxygen system for use in the UH-1, OH-58, CH-47 and EH-60 aircraft will be type classified standurd. Complete Development Test/Operation Test II of the On-Board Oxygen Generating System (OBOGS) installed in RV-ID and Ed 21 aircraft. Engineering development will be initiated for the Inflatable Body and Head Restraint System (IBAHRS) based on successful completion of the validation phase. An engineering development contract will be awarded by the Naval Air Development Command for system Integration in the AH-1S and AH-64 aircraft. Initiate Development/Operational Test II or the Emergency Locator Transmitter (ELT). All necessary experimental work for the HEGS-10 and the IBAHRS will be performed, and those systems will be ready for full-scale development.

HNCLASSIFIED

Program Element: 16.42.04.A

DOD Mission Area: 1261 - Airlift

Title: Air Mobility Support Equipment
Budget Activity: 14 - Tactical Programs

5. (U) Program to Completion: This is a continuing program. All FY 1982 efforts are scheduled to be completed with achievement of an initial Operational Capability (IOC) by FY 1986 except for the Aviation Ground Power Unit (AGPU) and Aviation Decontaminating De-Icing and Cleaning System (ADDCS) which have an estimated IOC for FY 1987.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.06.A
DOD Mission Area: #261 - 41rlift

Title: BLACKHAWK

Budget Activity: #4 - Tactical Program:

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

Project <u>Nomber</u>	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 5259	FY 1981 Estimate 5046	FY 1982 Estimate 6158	FY 1983 Estimate 3110	Additional to Completing	Total Estimated Cost 498214
D069	UH-60 Feasiblity Demonstration	3000	5046	6158	3110	U	17314
0378	BLACKIIAWK (UII-60A)	2259	0	o	0	o	480900

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program will demonstrate the feasibility of firing the HELLFIRE missile from the UH-60 aircraft, a Congressional initiative. The program also satisfies an Army requirement to establish and qualify aircraft 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 BLACK HAWK.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Funds are required to cover the third increment of contract of effort to include qualification flight testing, sissile firing, and a preliminary airworthiness evaluation.

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1980 Submission
Contract Award	February 1981	Not Shown
Critical Design Review	June 1980	Not Shown
lat Missile Firing	2nd Qtr FY 1982	3rd Qtr FY 1981
Demonstration Completion	lst Qtr FY 1983	4th Qtr FY 1981
Final Report	3rd Otr FY 1983	1st Otr FY 1982

An initial schedule adjustment was required for in-house design determinations, coordination of a Hischon Needs (NR) document and to obtain and evaluate a development proposal from Sikorsky Aircraft. The Aviation Research and Revelopment Command

UNCLASSIFIED

11-208 - Cl, 11 Mar 81

Program Element: #6.12.06.A DOD Mission Area: #261 - Airlift Title: BLACKHAWK

Budget Activity: #4 - Tactical Programs

developed the total program cost estimate based on an analysis of similar engineering development in the Advanced Attack Helicopter program and evaluation of contractor development proposals.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
ROTE					
Funds (current requirements)	5259	5046	6158	3110	498214
Funds (as shown to FY 1981 submission)	1000	5420	o	0	8420

FY 1980 and 1981 funds for the UH-60 Feasibility Demonstration were shown under Program Element 6.43.10A, Heliborne Missile-HELLFIRE, in the FY 1981 budget submission. There were no funds requested for project D378, BLACK HAWK, in the FY 1981 budget request; consequently no Congressional Descriptive Summary was submitted. Subsequently, \$1999 was reprogramed into D378, BLACK HAWK, to complete maturity testing, and an additional \$300 was later added as reported to Congress in December 1980 in a Notification of Reprograming. The FY 1981 decrease reflects a Congressional reduction in inflation adjustment. FY 1982 and FY 1983 funds were added to satisfy an Army requirement to develop and qualify an external stores support system capable of supporting the H-56 mine-lispensing system or external fuel tanks required for improved self-deployability and extended mission ranges for the UH-50A, BLACK HAWK. The remainder of the Total Estimated Cost reflected for Current Requirements (\$178641) is attributable to Project D378, BLACK HAWK.

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

UNCLASSIFIED

11-209 Ct, 31 Mar 81

Elichard C

Program Element: #6.42.06.A DOD Mission Area: #261 - Airlift Title: BLACKHANK Budget Activity: 14 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This project encompasses the design, development, test and full qualification of the External Stores Support System (ESSS), the feasibility demonstrations of the HELLFIRE missile and M-56 mine dispensing system, and the development of an external fuel system for extended range capability. Funds have been programed to incrementally fund the following efforts through program completion in FY 1983:
- l. (U) Relocate, design, and qualify fuselage hard points and a removable external stores system for the UH-60A capable of carrying eight MELLFIRE missiles on each side of the UH-60A. The stores system will also be capable of carrying external fuel tanks and mine dispensers.
- 2. (8) Conduct flight tests to qualify the ESSS with external fuel tanks and to evaluate compatibulity of the system with missiles and launchers.
- 3. (U) Fire ballistic missiles to insure HELLFIRE 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 aiructural loads and stability of the airframe and missile.
- 4. (U) Conduct a preliminary airworthiness evaluation and a developmental test by the US Army Test and Evaluation Command. Contract award is scheduled to allow coordination of Letter of Agreement (LOA) requirements and a UH-60A Mission Needs (MN) change to accommodate the External Stores Support System (ESSS).
- G. (U) RELATED ACTIVITIES: The HELLFIRE missile is being developed under Program Element 6.43.10.A, Heliborne Missile-HELLFIRE.
- H. (U) WORK PERFORMED BY: United Technologies Corporation, Sikorsky Aircraft Division, Stratford, GT; Rockwell International, Columb. OII; BLACK HAWK Project Manager's Office, St. Louis, MO.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: In September 1980, a contract was awarded to Rockwell International for missible and launcher refurbishment and test support. Contract to the attframe contractor, Sikorsky Aircraft, to initiate the design and modification of hard points and external stores and fabrication of test articles has been dilayed to allow coordination of the Letter of Agreement (LOA) with a draft Mission Needs (MN) change for the UH-60A helicopter. The LOA is in the final stages of staffing and will be signed prior to contract award currently scheduled for February 1981.

UNCLASSIFIED

Program Element: #6,42,06.A DOD Mission Area: #261 - Airlift Title: BLACKHAWK
Budget Activity: 14 - Tactical Programs

- 2. (U) FY 1981 Program: System design, fabrication of flight articles, integration with flight vehicle, instrumentation, and initial flight tests will be accomplished during FY 1981.
- 3. (U) FY 1982 Planned Program: Handling qualities evaluation with missiles installed, firing of three hallistic missiles, test analysis, mine dispenser Jesign verification testing, external stores system qualification flight testing, and preliminary airworthiness by the Army Aviation Engineering Flight Activity (AEFA), Edwards AFB, CA are scheduled for FY 1982.
- 4. (0) FY 1983 Planned Program: Completion of flight testing; design and qualification of fuel, pneumitic, and electrical systems for transfer of external fuel; and government developmental testing are scheduled to complete required engineering development.
 - 5. (II) Program to Completion: Engineering development is scheduled to be completed with FY 1983 funding.

UNCLASSIFIED

11-211

Linemark \

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SURMARY

Trogram Element: #6.42.07.A DOD Hission Area: #211 - Close Combat Title: Advanced Attack Helicopter Budget Activity: #4 - Tactical Programs

A. (0) RESOURCES (PROJECT LISTING): (\$ in thousands)

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 actual 176036	FY 1981 Estimate 172946	FY 1982 Estimate 94027	FY 1983 Estimate 0	Additional To Completion 0	Total Estimated Costs 1141385
0425	Advanced Attack Helicopter	176036	172946	9402.	Û	U	1141385

BRIEF DESCRIPTION OF ELEMENT AND MISSION REED: The Army needs the Advanced Attack Helicopter (AAH) to pro 100 a significantly improved tank-killing capability over the current All-1 attack hericopter to assist in deteating nume co-stly superior Marsaw Pact armor forces. In recognition of the sophistication and lethality of the air detense threat and improvements in the ballistic protection of Marsaw Pact armor, a more survivable, versatile, and lethal attack helicopter is required to maintain a favorable combat exchange ratio. The AMI 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 detect; and a mission equipment package to allow day, night, and adverse weather operation, high solvivability, and onequalled versatility. Aircraft armament includes the HELLFIRE Modular Missile System, 30mm chain gun, and 2.75-inch tockets. The AH-64 will be the Army's primary attack helicopter and will be complemented by the AH-1 series attack helicopters. The pro tam is currently in Full-Scale Engineering Development (Phase 2), which was preceded by competitive airtramdevelopment.

C. (I) BASIS FOR FY 1982 RDTE REQUEST: Provides funds to develop support and test equipment for maintenance task, develop diagnostic programs for mission equipment status, qualify automatic test equipment, correct deficiencies discovered in OT II, flight test a composite main rotor blade, conduct tests in climatic hangar and an icing survey in Minnesota, and provide d to from thight tests for preparation of Army crew manuals,

11 212

Program Element: #6.42.07.A DOD Mission Arva: #211 - Close Combat Title: Advanced Attack Helicopter
Budget Activity: #4 - Tactical Programs

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1981 Submission
Award Aerial Vehicle Development		
Contract (Phase 1)	June 1973	June 1973
Firs! Flight	September 1975	September 1975
Complete Air Vehicles Fly-Off	September 1976	September 1976
Award Full-Scale Engineering	•	
Development Contract (Phase 2)	December 1976	December 1976
Award Competitive Target Acquisition	December 1976	December 1976
Designation Systems		
and Pilot Night Vision Systems		
(TAUS/PNVS) Contracts	March 1977	March 1977
Competitive TADS/PNVS Selection	Apr 11 1980	April 1980
Complete OT II	August 1981	August 1981
Production Contract Award	December 1981	December 1981
First Production Delivery	November 1983	December 1983
Initial Operational Capability (IOC)	January 1985	October 1984

Delay in first production delivery and IOC is a result of reduced procurement funding in FY82 and FY83.

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

NAME .	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
ROTE Funds (current requirements)	176036	172946	94027	o	1141385
Funds (as shown in FY 1981 submission)	176036	171564	58246	0	1104222

The funding level difference in 1981 is attributable to the application of higher fuel, inflation, and civilian pay pricing

UNCLASSIFIED

Program Element: #6.42.07.4

DOD Mission Area: #211 - Close Combat

Title: Advanced Attack Helicopter
Budget Activity: 14 - Tactical Programs

indices than were applied last year. FY 1982 is increased by \$35000 thousand to complete RDTE effort deferred from FY 1941 as a result of a mid-air collision on 22 November 1980 and loss of one prototype flight test vehicle. Remaining RDTE effort has been religiributed to the other four flight vehicles with some work being delayed until FY 1982. Other increased costs shown in FY 1982 are the result of higher fuel, inflation, and civilian pay pricing indices than were applied list year. This cost estimate is from Army cost analyses and should be achieved since FY 1982 is the last year of development and estimates in previous years have been valid.

E. (0) OTHER APPROPRIATION FUNDS: (\$ in thousands)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Cotal Estimated Cost
Alreraft Procurement, Army						
Funds (current requirements)	า	50800	365500	554100	4486900	5457 100
Funds (as shown in FY 1981						
submission)	0	50400	427400	Not Shown	3872300	4350100
Quantities (current requirements)	0	0	8	44	484	ol c
Quantities (as shown in FY 1981						
submission)	0	0	14	Not Sho	own 522	136

The funding level difference in 1981 is attributable to the application of higher inflation indices than were applied last year. Cost differences in FY 1982 were \$39,700 thousand as a result of higher inflation indices than were used last year; \$8,400 thousand from a new baseline cost estimate; and a reduction of \$110,000 thousand in the final preparation of the FY32-86 budget. This reduction caused an increase in the total estimate of \$76,400 thousand since procurement of 8 AAR's is delayed from FY82-86 to FY88-89. To meet outyear obligational authority, procurement was reduced in FY 1933 by \$230,100 thousand and in FY 1984 by \$267,400 thousand. This adjustment caused an increase in the total estimate of \$531,700 thousand since procurement of 111 AAR's is delayed from FY82-86 to FY88-89. It is planned to readjust the FY83-86 program to the original procurement profile in the FY 83-87 budget and thus grase this increase in the program estimate. The remaining \$449,100 thousand increase in the total estimate is from the application of higher inflation indices than were used last year.

UNCLASSIFIED

11-214

6 - 88 a 31 m s 4 - 4

Program Element: #6.42.07.A
DOD Mission Area: #211 - Close Combat

2.5

Title: Advanced Attack Helicopter
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: In September 1972, the US Army approved an Advanced Artack Helicopter (AAH) development program for an attack helicopter with greater agility, better performance, and a greater aerial fire support capability than currently available in existing Army aerial weapons systems. The AAH program was presented to the Defense Systems Acquisition Review Council (DSARC I), 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 (FY/2 constant dollars) constraint on the recurring fly way design to unit production cost, based upon in 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 compatitive selection between contractors. Five helicopter manufacturers, Bell, Sikorsky, Boeing-Vertol, Highes, and Lockheed responded to the RPP. As a result of the HELLFIRE DSARC on 25 F bruary 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 Adequisition Designation Sight (TADS) and the Pilot Night Vision Sensor (PNVS) be competitively developed with flyoff on the AAR. Development of the AAR consists of two phases. The first phase was conducted as a flyoff of two prototypes each from the competing contractors, Bell Helicopter Textron and Hughes Helicopters, to insure airframe acceptability in the critical area of flight handling quantities 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 II, 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 consists of modification of the two Hughes Helicopters' Phase Laircraft, fabrication 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 with Martin Martetta and Northrop Corporation. Martin Martin 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 amountation for the 30mm gun on the YAN-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 NAB program manager has development responsibility for this ammunition. A project manager for the TADS/PNVS and a product manager for the 10mm ammunition have been designated to assist the Advanced Attack Helicopter program manager in the development of the AAH system.

G. (U) RELATED ACTIVITIES: The Army AH-1S COBRA/TOW, Program Element (PE) 6.42.12.A, and the Hariae Corps AH-1T are related helicopters. The AH-1S provides the Army a current aerial antitank capability with the TOW elestie until the availability of the higher performance AAH. The AH-1S will constitute the "low"end of the high-low attack helicopter mix. The AH-1S and AH-1T

UNCLASSIFIED

Program Element: #6.42.07.4 DOD Mission Area: /211 - Close Combat Title: Advanced Attack Helicopter
Budget Activity: #4 - Tactical Programs

lack performance, adverse weither mission capability, firepower, night vision devices, and survivability characteristics required of the attack helicoprer and available in the AAH. 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 deceloped under PE The 30mm ADEM/OBMA ammunition is being developed under PE 6.42.02.A, Aircraft Weapons. These related activities are all carefully montgored to preclude duplication of effort.

H. (U) WORK PERFORMED BY: Hughes Helicopters, Culver City, CA, is the airframe and 30mm anomunition developer and is H. (U) MORK PYRPORMED BY: Hughes Helicopters, Culver City, CA, is the airframe and JOmm ammunition developer and is responsible for the total weapon system integration in Phase 2. General Electric Company, Lynn, MA, is the minufacturer of the government-furnished T700 engine. Martin Marletta, 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; Carrett Aircsearch, 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, II.; Lockheel Aircraft Service Company, Ontario, CA; Menasco, Burbank, CA; RCA Automated Systems, Surlington, 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 1980 and Prior Accomplishments: Competitive contracts for Phase I development were awarded to Beli Helicopter Textron and Hughes Helicopters on 22 June 1973. Phase I development concentrated on aerial vehicle development. Phase 2 was scheduled to include subsystems development and subsystems 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 successfully completed on 30 September 1976. Source selection activities, which began in July 1976 when the 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

UNCLASSIFIED

Program Element: #6.42.07.A
DOD Mission Area: #211 - Close Combat

Title: Advanced Attack Helicopter
Budget Activity: #4 - Tactical Programs

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 Selecton 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 systems 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 leadings. 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 handling 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.

- 2. (U) FY 1991 Program: Contractor and government flight testing will continue on all four vehicles with emphasis on reliability, availability, and maintainability (RAM) culminating in a user assessment of RAM during the OT II in June through August 1981. Long Lead Time Item (LLTI) contracts will be awarded during February 1981 in preparation for the production contract in December 1981.
- 3. (U) FY 1982 Planned Program: Data from Operational Test (OT) II, completed in August 1981, will be prepared for the use of ASARC/DSARC II production decision in November 1981. Contract award for the production Phase will be made to Hughes Helicopters and the TADS/PNVS winner during December 1981. Development and test efforts will include development of support and test equipment for maintenance tasks, development of diagnostic programs for mission equipment, and qualification of automatic test equipment. Additional effort will correct deficiencies found in OT II. A composite main rotor blade will be flight tested on the Advanced Attack Helicopter (AAH). The Army will also conduct tests in the Eglin AFB climatic hangar, an icing survey in Minnesota, and perform flight tests to provide data for Army crew manuals.

UNCLASSIFIED

Program Element: 16.42.07.A

DOD Mission Area: 1211 - Close Combat

Title: Advanced Attack Helicopter Budget Activity: 14 - Tactical Programs

- 4. (U) FY 1983 Planned Program: Procurement of 44 AANs.
- 5. (U) Program to Completion: Procurement of AAH will continue.

UNCLASSIFIED

11-218

and the second of

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.07.A DOD Mission Area: #211 - Close Combat Title: Advanced Attack Helicopter
Budget Activity: 14 - Tactical Program

1. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

- a. (0) The AAR developmental program is divided into two phases. Phase I was competitive development of the basic aircraft with very limited weapons integration. Phase 2 encompasses the integration of all weapons s baystems into the winning Phase 1 ircraft 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). 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 I testing on 30 September 1976. Phase I 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 was conducted utilizing the Ground Test Vehicle (GTV) beginning In April 1975. Following successful completion of GTV qualification testing, first flights occurred on 30 September and 1 Octobr 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 aircraft flight handling qualities. The 30mm cannon and 2.75-inch rockets underwent limited in-flight firing tests also.
- (2) (U) The Army Engineering Flight Activity (AEFA) at Edwards Air Force hase, California, conducted Development Test (DT) I during July-September 1976 to evaluate flight handling qualities and aircraft performance including in-flight firing of the 30mm cannon and 2.75-inch rockets. Reliability, availability, and maintainability (RAM) data was obtained throughout the DT test program. The Army selected the Hughes YAH-64 to enter Engineering Development (Phase 2), and a contract was awarded on 10 December 1976.

UNCLASSIFIED

Program Element: #6.42.07.A DOD Mission Area: #211 - Close Combat Title: Advanced Attack Helicopter Budget Activity: 14 - Tactical Program

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 unrollable auxiliary power unit and engine starting system, and structural inadequacy of the cooling fan associated with the intrared suppression system. Design changes have been made in Phase 2 as discussed below.

- (1) (U) Phase 2 developmental tests (DT) make maximum use of contractor/government integrated tests to eliminate duplication and have expanded the aircraft flight envelope and evaluated modifications that have been proposed to the Finase 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 I 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; undestrable handling characteristics with Stability Augmentation System (SAS) off in left sideward flight and at speeds above 120 knots true; 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 I prototypes. These modifications included incorporation of the suit of weapons subsystems (e.g., Target Acquisition Designation Sensor (TADS), Pilot Night Vision Sight (PNVS), and HELLPIRE missile) and airframe-related changes such as 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 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 afteraft arrived at the weapon test facility at Yuna 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. Plight 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 aircraft from Phase 1 and 3 new helicop ters. The Phase I aircraft had a series of modifications so as to generally conform to the final specification. The new

UNCLASSIFIED

11-220

A 10 Carried 3

Program Element: #6.42.07.A
DDD Mission Area: #211 - Close Combat

Title: Advanced Attack Helicopter
Budget Activity: 14 - Tactical Program

Phase 2 alreads are the production configuration, and producibility engineering is being implemented for them. No 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. (II) In May 1980, the aircraft with all final subsystems entered the final period of test and evaluation. Prior to this time, the four system prototypes were in several unique configurations primarily determined by the stabilizer configuration and the TADS/PNVS type. In April 1980, Martin Marietta was selected as the winning TADS/PNVS competitor and was awarded a contract to complete TADS/PNVS development. The final 15 months of the developmental program will, therefore, be testing all aspects of a total system for battle.
 - e. (U) In accordance with the AAH development contract the following T&E assignments apply:
 - (1) (U) Development Contractor:
 - (a) (II) Prototype Aircraft Hughes Helicopters, Culver City, CA
 - (b) (U) TADS/PNVS Martin Marietta Co, Orlando, FL
 - (c) (U) 30mm Ammo Hughes Helicopters
 - (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 Manager: MG E. M. Browne, Program Manager--AAH, US Army Materiel Development and Readiness Command.
 - (4) (U) Development Test and Evaluation:
 - (a) (B) US Army Test & Evaluation Command (USATECOM) Yuma Proving Ground, AZ, and Electronics Proving Ground, MD
 - (b) (II) US Army Aviation Research and Development Command (USAAVRADCOM), St Louis, MO
 - (c) (U) Hallistic Research Laboratory (BRL), Aberdeen Proving Ground, MD

UNCLASSIFIED

Program Element: #6.42.07.A DOD Mission Area: #211 - Close Combat Title: Advanced Attack Helicopter
Budget Activity: 44 - Tactical Program

- (d) (U) US Army Aeromedical Research Laboratories (USAARL), Pt Rucker, AL
- (e) (U) US Army Communications and Electronics Research Command (USACERCOM), Night Vision Laboratorius (NVL), Fi Monmouth, NJ
 - (f) (U) US Army Materiel Systems Analysis Agency (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). Alijacent USHC Camp Pendleton is used to fire the various weapons in a restricted mode. Government DT air vehicle tests are 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 (row YPG (e.g., natural loing tests in northern Minnesota).
- g. (U) Future major test reviews are scheduled for: February 1981 Long-leadtime Items, and November 1981 Army and Defense Systems Acquisition Review Councils (ASARC/DSARC 111).
- (U) Four flying prototypes are in the test program. In addition, one ground test vehicle is used to support the power train qualification.
- 1. (U) A total of 62 HELLFIRE guided missile firings is planned during the AAH test programs. These firings will contribute to the development of this missile which is being conducted by a separate project manager at US Acmy Missile Command. Of the 62 AAH missile firings, 59 are guided without warhead, and 3 are guided with high-explosive intitank war-
- j. (U) Reliability, availability, and maintainability (RAM). RAM data will be collected during developmental testing to assist the RAM assessment at OT II. Specific RAM objectives are listed in paragraph 2f.
- (U) The total system is designed to meet the requirements for worldwide operations. In further mee 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 similated environments (WCLASSIFIED

11-222

C. W. S. W. L. A. .

Program Element: #6.42.07.A DOD Mission Area: #211 - Close Combat Title: Advanced Attack Helicopter
Budget Activity: 44 - Tactical Program

ronments 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:

- a. (II) Operational Test (OT) I was conducted in September 1976 at Edwards Air Force Base, CA, by the US Army Operational Test and Evaluation Agency (OTEA) in conjunction with Development Test (DT) I. Approximately 16 hours were flown on each contractor's design during this test utilizing representative attack helicopter mission profiles. Afteraft flight and detectability characteristics and mission performance in a low-level and nap-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 the US Army Forces Command (FORSCOM) units as copilot/gunner. Operational Army maintenance personnel observed all maintenance activities. The current Army attack helicopter (AN-13) was concurrently flown on all YAH-64 missions to establish comparative baseline information. The full weapons, visionics, and navigation subsystems were not tested during OT I. OTEA prepared an Independent evaluation of OT I which was briefel to the Army Systems Acquisition Review Council in December 1976. OTEA concluded that the Advanced Attack Helicopter (ANU) was suitable for continuation into the next phase. The major discrepancies identified were those associated with the auxiliary power unit and starting system. These were previously discussed in the Development Test section.
- b. (II) OTEA is scheduled to conduct OT II, separate from developmental tests, during June-August 1981 at Ft
 Hunter-Liggett, CA. Three fully equipped YAH-64 prototype helicopters will fly approximately 350 hours under a complete range of flying conditions and mission profiles. This test will be an operational evaluation of the full subsystems-equipped aircraft and will obtain reliability, availability, and maintainability (RAM) data prior to a production decision. It will include firing of the HELLFIRE, 30mm, and 2.75-inch rocket systems, as well as nonfiring exercises. Flight crews and maintenance personnel will be provided by FORSCOM. OTEA will prepare an independent evaluation.
- c. (U) The AAH RAM-operational suitability verification which will take place during OT II will be a true operational suitability test where a mix of simulated missions including the AAH primary and alternate mission profiles will be flown by Army pilots. Army ground support personnel will perform all support functions. Proper ground support equipment, including most automatic test equipment, will be utilized for the test. Operational realism will be emphasized. An Army RAM data collection team will gather data throughout the test for determination of AAH reliability and maintainability characteristics.
 - d. (II) Operational Test Agencies:

Program Element: 16.42.07.A

DOD Mission Area: 1211 - Close Combat

Title: Advanced Attack Helicopter
Budget Activity: #4 - Tactical Program

- (1) (U) US Army Porces Command (USAFORSCOM), Ft McPherson, GA.
- (2) (U) US Army Training and Doctrine Command (USATRADOC), Ft Monroe, VA.
- e. (U) Independent Operational Test Agency: US Army Operational Test and Evaluation Agency (USAOTEA), Falls Church, VA.

f. (U) The reliability, availability, and maintainability (RAM) assessment at the completion of Operational Test (OT) II will be based on data collected in OT II and all flight test data accumulated during Phase 2 developmental testing. Army maintenance personnel will perform unit and intermediate maintenance support on all systems and subsystems except for Target Acquisition Designation Sight (TADS) and Pilot Night Vision Sensor (PNVS) removal and replacement and assemblack box diagnostics. The RAM objectives in terms of maintenance man-hours per flight hour (MMH/FH) and mean time between failure (MTBF), which are to be assessed at OT II, are listed below along with the values to be achieved at full-rate production after completion of the follow-on evaluation. These values are supported by reliability growth analysis. Full maturity of RAM characteristics is expected to occur at approximately 100,000 flight hours.

RAM REQUIREMENTS

	11 10	Full-Rate Production
MMH/ PH	14.4	13
System Reliability (MTBF ~ hours)	1.95	2.2
Mission Reliability (MTBF - hours)	17.6	18.5
TADS Reliability (MTBF - hours)	100	108
PNVS Reliability (MTBF - hours)	120 .	130

3. System Characteristics:

II-224

r to Garage & .

Program Element: #6.42.07.A

1900 Mission Area: #211 - Close Combat

Title: Advanced Attack Helicopter Budget Activity: #4 - Tactical Program

Operational/Technical		
Characteristics*	Ob ject ive	Demonstrated Performance**
Primary Mission Gross Weight (PMGW)-1bs	13910	1 3920
Cruise Airspeed @ PMGW (Knots)	145-175	142
Vertical Rate of Climb @ PMGW-(feet per		
minute)	450-500	470
Mission Reliability	.95	
Weapon Accuricy (P _H) 30mm	•	
HELLFIRE (stationary targets)	1	
Lateral accoleration (g's)	.2535	.29
Endurance (hrs) - Primary Mission	1.83	1.83
- Alternate Mission	2.5-2.8	2.50
Expendable Ordnance @ PMGV		
HELLFIRE Missile (No.)	8-12	8
JOMN (rds)	320-500	320
Target Recognition (km) Maximum - Day - Night		
farget Designation (km) Maximum Day		
Night		

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, and TADS/PNVS competition and resting at Yuma Proving Grounds.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.12.A DOD Mission Area: 1211 - Close Combat Title: COBRA/TOW

Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 945	FY 1981 Estimate 8515	FY 1982 Estimate 20074	FY 1983 Estimate 8561	Additional to Completion To be Determined	Total Estimated Cost To Be Determined	
D639	COBRA/TOW	945	8515	20074	8561	To Be Determined	To Be Determined	

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program is needed to develop a night/obscured battlefield antiamor capability for the AH-IS, COBRA/TOW, by incorporating forward looking infrared (FLIR) in the TOW Missile system and to develop the necessary control features for complete compatibility with the TOW and improved TOW missiles (TOW II), as an Integral element of the ground combined arms team. The AH-IS is a single-engine, two-seat attack helicocpter designed to deliver the TOM missile, 20mm ammunition, and 2.75-inch rockers. However, its capabilities are limited primarily to daytime operations. The AH-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 1982 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 (TOW II).

Major Milestones

Milestone Dates

Milestone Dates Shown in PY 1981 Submission

Development Contract for Facts/I-TOW

Apr 1981

Not Shown

Program Element: #6.42.12.A
DOD Mission Area: #211 - Close Combat

Title: COBRA/TOW
Budget Activity: #4 - Tactical Programs

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	945	8515	20074	8561	To be determined
Funds (as shown in FY 1981 subwission)	970	9145	4560	-	To be determined

The reduction in FY 1980 reflects funds reprogramed to higher priority Army requirements. The FY 1981 decrease reflects the application of general Congressional reductions. The FY 1982 figures reflect concurrent development efforts to gain complete capability with the improved TOW missile by incorporating a digital control system.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Aircraft Procurement, Army: Funds (current requirements, New Aircraft)	29500	44500	-	-	-	-
Funds (as shown in FY 1981 gubmission)	29500	-	-	-	-	505100
Quantities (current requirements) Quantities (as shown in FY 1981 submission)	12 15	17	-	-	-	-

UNCLASSIFIED

Program Element: 46.42.12.A

DOD Mission Area: 4211 - Close Combat

Title: COBRA/TOW Budget Activity: #4 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	PY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Funds (current requirements- Modification of Aircraft)	276400	138900	33100	117200	219300	1277200
Funds (as shown in FY 1981 submission)	276400	121300	18300	To be determined	To be determined	fo be determined
Quantitles (current requirements)	160	76	-	-	-	-
Quantities (as shown in FY 1981 submission)	160	64	-	-	-	-

The FY 1980 new procurement quantity reflects numbers of aircraft procured under a new contract reflecting higher subsystems costs. FY 1981 new buy figure of \$44500 thousand represents amount authorized by Congress for new AH-18's. Indeer Modification of Aircraft, Congress authorized \$17200 thousand for modification of 12 TH-16's to AH-18's in FY 1981. Increased costs shown in FY 1982 and beyond reflect required funds to procure aircraft survivability equipment and the enhanced M65 TOW missile system.

UNCLASSIFIED

Program Element: #6.42.12.A BOD Mission Area: #211 - Close Combat Title: COBRA/TOW Budget Activity: #4 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: To fulfill an urgent requirement for an operational aerial antitank system, the Army initiated a development program to equip the AH-IC (COBRA) aircraft with the Tube-Launched Optically Tracked Mire-Guided (TOW) missile system. This system was designed as the AH-IQ. During operational testing of the AH-IQ, it was determined that certain performance limitations resulted from the additional weight of the TOW missile system. A Product Improvement Program (PIP), designed to alleviate the performance limitations in the area of hover performance and payload capabilities, was initiated during FY 1974. 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-ID 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 was designated the AH-IS. Funds were approved in FY 1974 and FY 1975 to modify 290 existing AH-IG's. Additional funds were approved in FY 1979 to convert and modernize 160 more AH-IG COBRA's to the AH IS COBRA/TOW configuration as the initial effort toward modernizing the remainder of the existing AH-IG flect. Funds were also approved in FY 1975 thru FY 1980 to procure 309 new AH-IS COBRA/TOW's.
- G. (8) <u>RELATED ACTIVITIES</u>: Prior to the revised FY 1973 budget, the Improved COBRA Armament 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 armament subsystem were shifted in FY 1977 to this program element. Also shifted to this element was the air naced 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. This restructuring consolidated all ongoing developmental COBRA improvement projects under a single program element (6.42.12.A) to obtain optimum program management. Office of the Secretary of Defense approved development of both the Army AH-IS and Marine AH-IJ helicopters because of different mission requirements.
- II. (U) WORK PERFORMED BY: Contractors: Bell Helicopter Textron, Ft. Worth, TX Airframe; Kaman 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 program is managed
 by the Project Manager, COBRA, US Army Troop Support and Aviation Readiness Command, St. Louis, MO.

UNCLASSIFIED

Program Element: #6.42.12.A
DOD Mission Area: #211 - Close Combat

Title: COBRA/TOW

Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND PUTURE PROGRAMS:

- 1. (U) FY 1980 and Prior Accomplishments: Development and qualification, including contractor and government testing, of the Universal Turret (UT) and Rocket Management Subsystem (RMS) was completed in October 1979. Production deliveries with the UT subsystem began in September 1978. Pabrication of the prototype fire control subsystems was completed and initial testing began in September 1978. The fire control subsystem developmental testing including operational issue was completed in November 1979. Ground operational checks, aerial nonfiring performance tests, and aerial firing performance tests to verify accuracy and performance in all functional modes of pilot heads-up-display (NUD), fire control computer (ECC), air data system (ADS), and laser rangefinder will be accomplished.
- 2. (U) FY 1981 Program: Begin full-scale engineering program for development of night capability for the COBRA/TOW by incorporating common module forward-looking infrared components into the COBRA/TOW telescopic sight unit. Complete prototype design.
- 3. (U) FY 1982 Planned Program: Continue engineering development of the FLIR-augmented COBRA/TOW sight (FACTS). Major effort directed towards fabrication of production prototypes, and begin systems integration. Begin Producibility Engineering and Planning (PEP).
- 4. (U) FY 1983 Planned Program: Complete 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 1983.

UNCLASSIFIED

11~230

40.00

UNCLASSIFIED FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.15.A DOD Mission Area: #261 - Airlift Title: UH-1 Modernization
Budget Activity: 14 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 200	FY 1981 Estimate	FY 1982 Estimate O	FY 1983 Estimate O	Additional to Completion 16656	Total Estimated Cost 16856	
D147	UH-1 Modernization	200	0	0	0	16656	16856	

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The objective of this program is to meet continuing Army requirements for UII-IH/V combat support utility helicopters in the active Army and Army Reserve components by modernizing and extending the twenty-year service life of current UII-IH/V assets. To meet this need, the aircraft will be returned to depot for modification to the service life extension configuration and accomplishment of selected mission-required product improvements. This configuration includes a change from metal to composite main rotor blades which will provide increased life and reliability, improved performance, reduced maintenance, and increased survivability, safety, and producibility.
- C. (U) EXPLANATION OF CANCELLATION OR DEFERRAL: The FY81 RDTE request was for initiation of the design and development of a composite main rotor blade for the UH-1. Congress interposed no objection to the overall UH-1 aircraft system modernization; however, they did question further development investment in composite rotor blades when the technology exists presently. Additional development, with attendant cost, is required for each different helicopter type due to differences in rotor systems, controls, and aircraft operating envelopes. Deferral of FY82 funding was due to requirements of higher priority Army programs.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.17.A

DOD Mission Area: #261 - Airlift

Title: Synthetic Flight Training Syntoms
Budget Activity: 14 - Tactical Programs

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

							Total
Project		FY 1980	FY 1981	FY 1982	FY 1983	Admit (onal	Estimated
Number	Title	Actual	Estimate	Est imat e	Estimate	to Completion	Cost
	TOTAL FOR PROGRAM ELEMENT	1098	0	8333	TBD	Continuing	Not Applicable
D275	Synthetic Flight Training	1098	0	8333	TBD	Continuing	Not Applicable
	, -						

- 8. (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. The goal is to produce a simulation of the combat environment for tactical flight, to include nap-ot-the-earth (NOE), weapons engagement, and enemy interaction, in order to provide realistic and cost effective training. 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 1982 RDTE REQUEST: To initiate full-scale engineering development of the williant 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 Sight (PNVS), and all weapon subsystems on the AH-64.
- D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

RDTE	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Estimated Cost
Funds (current requirements)	1098	0	8333	TBD	Cont couling	Not Applicable
Funds (as shown in FY 1981 submission)	1198	- ° 0	14733	N/A	Continuing	Not Applicable

UNCLASSIFIED

11-232 C1, 31 Mar 81

Program Element: #6.42.1/.A

DOD Mission Area: #261 - Airlift

Title: Synthetic Flight Training Systems
Budget Activity: 14 - Tactical Programs

The FY 1982 decrease in funding is due to program adjustments due to the lack of sufficient funding priority within Army resources.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Alreraft Procurement, Army	*****					
Funds (current requirements)	16800	0	31300	TBD	Continuing	Not Applicable
Funds (as shown in FY 1981	N . Cl					
submission)	Not Shown					
Quantities (current requirements)	2(CH-47)	0	2(AH-1S) 1(CH-47)	2(AH-15)	Continuing	Not Applicable
Quantities (as shown in FY 1981						
submission)	Not Shown					
Military Construction, Army						
Funds (current requirements)	2350	9110	10200	8430	Continuing	Not Applicable
Funds (as shown in FY 1981						• •
submission)	Not Shown					

Funding in FY81 was deferred due to resource requirements of higher priority programs. Aircraft Procurement, Aimy and Military Construction, Army data submission was not required for FY81 deferred 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 securatio, the operating environment, and the measurement of the pilot's performance. Each simulator

HINCLASSIFIEB

11-233 C1, 31 Mar 81

Constant Ann

....

Program Element: #6.42.17.A DOD Mission Area: #261 - Airlift Title: Synthetic Flight Training Systems
Budget Activity: 14 - Tactical Programs

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 device will be the tiret training simulator capable of simulating the full combat mission to include hostile enemy interaction. All AH-64 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 (PAVS), 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 All 1, CH-47, and UH-60 simulators. Developing contractor for the AH-64 Combat 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.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 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 17 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 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. Production of the AH-1 simulator will begin in FY 1981. The 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 1981 Program: Not funded.
- 3. (U) FY 1982 Planned Program: Initiate full-scale engineering development of the combat mission simulator for the Advanced Attack Helicopter. Due to the limited funds available, it is anticipated that long-lead items and government-furnished equipment (GFE) will require most of the available funds.
- 4. (U) FY 1983 Planned Program: Continue the development of the combat mission simulator for the Advanced Attack Helicopter. An interim device for meeting the CY 1984 training need date will be considered as a part of the overall development of the combat mission simulator for the Advanced Attack Helicopter.

UNCLASSIFIED

Program Element: #6.32.17.A

DOD Mission Area: #261 - Airlift

Title: Synthetic Flight Training Systems
Budget Activity: #4 - Tactical Programs

5. (U) Program to Completion: This is a continuing program. The development effort for the All-64 combat mission simulator is expected to continue through FY 1986.

UNCLASSIFIED

11~235

PY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.18.A

DOD Mission Area: #261 - Airlift

Title: Airdrop Equipment Development
Budget Activity: 14 - Tactical Programs

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

Project Number	Title	PY 1980 Actual	FY 1981 Estimate	fY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	823	2533	3184	4656	Continuing	Not Applicable Not Applicable
D279	Airdrop Equipment Development	823	2533	3184	4656	Continuing	Not Applicable

- B. (U) 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 and special operations and airdrop resupply of both conventional and airborne forces. 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 contingency plans for the deployment of an airborne division and thus is vital to national defense. The airdrop of supplies is increasing in importance in view of the increased need for a Rapid 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 airdrop mission and technology needs of many ailied countries.
- C. (U) BASIS FOR FY 1981 RDTE REQUEST: Complete development, type classify and field Personnel Maneuverable Reserve Pirachute for Free-Fall and a new airdrop platform. Continue development of Two-Staged Personnel Parachute System with accompanying loads and High Altitude Airdrop Resupply System (500-pound capacity) in support of special airborne operations; initiate development of 60,000-pound-capacity airdrop system and drop zone assembly aids (visual) to provide organity needed new airdrop capability requested by XVIIIth Airborne Corps; initiate development of High-Speed Container Airdrop System to upgrade capability to airdrop critically needed supplies from high-performance aircraft; initiate tesks to provide airdrop engineering support for air transport and airdrop of Army material and for the development of the Air Force C-X aircraft.

UNCLASSIFIED

t t - 236

.

..

Program Element: 16.42.18.A

DOD Mission Area: 1261 - Airlift

.. Title: Airdrop Equipment Development
Budget Activity: 44 - Tactical Programs

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current regulrements) Funds (as shown in FY 1981	823	2513	3184	Continuing	Not Applicable
submission)	950	2721	3665	Continuing	Not Applicable

The FY 1980 reduction of \$127 thousand reflects a reprograming of funds to higher priority Army requirements. The decrease in FY 1981 is attributable to the application of general Congressional reductions. The \$481 thousand decrease in FY 1982 is the result of the transfer of funds to higher priority efforts outside the airdrop program.

E. (II) OTHER APPROPRIATION FUNDS: Not Applicable. (NOTE: Airdrop items are stock fund procured and managed.)

UNCLASSIFIED

Program Element: #6.42.18.A DOD Mission Area: #261 - Airlift Title: Atrdrop Equipment Development
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The on-going work under this program is dedicated to the development and fielding of alridrop systems, components, and techniques which will increase the mission capabilities of alridrop operations,
 reduce operational costs, increase reliability of airdrop materiels, and improve the readiness posture of airhorne and dirlift forces. The program supports Army, Marine Corps, Air Force, Navy, and Allied Forces (as requested). The major efforts through Piscal Year 1983 are focused on: providing a capability to airdrop heavy, outsize combat materiel up to 60,000 pounds; fielding a single platform usable for all modes of airdrop; extending capability to airdrop personnel at higher speeds/lower altitude and at large offsets from target areas with precision; improving personnel reserve parachute for free-fall; 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; and providing airdrop/air transport engineering support to Army materiel developers and to the Air Force C-X aircraft development program.
- (U) RELATED ACTIVITIES: Program Element's 6.22.10.A, Airdrop Technology, and 6.32.18.A, Airdrop Equipment and Techniques; Joint Technical Coordinating Group/Airdrop; Joint Air Movements Board; North Atlantic Treaty Organization (NATO), Air Trinsport Working Party; Air Standardization Coordinating Group, Working Party 44; Mutual Weapons Data Exchange Agreements with Prance, Germany, and Korea; United States/Germany Nonmajor Items Meetings.
- H. (U) WORK PERFORMED BY: Metric Systems, Inc., Pt. Walton Beach, FL; AAI Corporation, Baltimore, MD; Arthur D. Little Inc., Cambridge, MA; Ploneer Parachute Co., Manchester, CT; 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; Army Natick Research and Development Laboratories, Natick, MA.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Twelve new and improved Items were fielded during the prior four years, including MC 7 Military Free-Fall Parachute System; static line deployed Steerable Personnel Parachute; Ramp Bundle Delivery System for the C-130 Aircraft; Dragon Missile Jump Pack; Navy Emergency Air Cargo Delivery System; High-Speed, Low-Level Airdrop System (500-1b. capacity); and High-Altitude Airdrop Resupply System (2000-1b. capacity). Developed rigging procedures and qualified 128 items of priority munitions for airdrop. Fabricated test quantities of the Free-Fall Maneuverable Reserve Parachute and initiated development of High Altitude Airdrop Resupply System (500 pound capacity). Completed fabrication of test quantities of Type V Airdrop Platform. Provided airdrop and air transport engineering support to various developers of Army 'titeriel.

UNCLASSIFIED

Program Element: #6.42.18.A DOD Mission Area: #261 - Airlift - Title: Airdrop Equipment Development
Budget Activity: 44 - Tactical Programs

- 2. (U) FY 1981 Program: Continue to provide airdrop/air transport assistance to developers of Aimy materiel and initiate development of computer model to simulate loading Army materiel in air transport aircraft. Participate in contractor source selection, contractor design reviews and flight test planning of Air Force C-X developmental aircraft. Conduct development and operational tests of Type V Airdrop Platform. Complete development of CTU/2A High Speed Container Airdrop System and type classify. Complete development and operational tests of Free-Fall Maneuverable Reserve Parachute. Procure test quantities of components for High-Altitude Airdrop Resupply System (500-pound) and initiate development as well as operational testing.
- 3. (U) FY 1982 Planned Program: Design components, fabricate engineering design test quantities, and initiate design tests of critical components of 60,000-Pound Capacity Airdrop System. Continue to provide airdrop and air transport engineering assistance to developers of Army materiel and to develop computer model to simulate loading of materiel in air transport enteraft. Continue participation in the development of the Air Force C-X developmental aircraft and identify needed related Army airdrop developments. Complete development of Type V Platform and type classify. Complete fabrication of engineering check test quantities of Two-Staged Personnel Parachute components and initiate Engineering Check tests. Complete development of Froe-Fall Maneuverable Reserve Parachute and type classify. Complete development and operational tests of High-Altitude Airdrop Resupply System (500-pound capacity). Initiate engineering development of Drop Zone Assembly Aids (Visual), High-Speed Container Airdrop System (1000-pound capacity), and Two-Staged Personnel Parichute Systems.
- 4. (U) FY 1083 Planned Program: Continue engineering development of 60,000-pound-capacity airdrop system. Complete the computer stantition model of cargo-loading operations for air transport aircraft and provide airdrop/air transport engineering assistant to developers of Army materiel. Continue to participate in design reviews, test planning and engineering evaluations of Air Force C-X developmental aircraft. Complete Engineering Check tests of Two-Staged Personnel Parachute System, fabricate development test quantities, and initiate development testing. Type classify High Altitude Airdrop Resupply System (500-pound). Complete development and operational tests of Drop Zone Assembly Aids (Visual) System and initiate development of level II (improved) Drop Zone Assembly Aids (Visual) System. Conduct wind tunnel tests of High Speed Container Airdrop System. Initiate development of Airdrop Controlled Exit System, Bundle Airdrop System (C-141 aircraft), and Personnel Offset/Precision Airdrop System.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

I I - 239

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.20.A
DDD Mission Area: #255 - Tactical Surveillance

Title: Army Helicopter Improvement Program
Budget Activity: #4 - Tactical Programs

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

Project Number	TITLE TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual	FY 1981 Estimate 25939	FY 1982 Estimate 39373	FY 1983 Estimate 45876	Additional to Completion 48812	Fotal Estimated Cost 150000 Fo be determined
D518 Prog	Army Helicopter Improvement	o	25939	39373	45876	48812	160900

- 8. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Ground commanders require highly survivable, flexible, and responsive means to conduct reconnaissance, surveillance, security, target acquisition, and target designation functions in reduced visibility conditions and all levels of intensity of warfare. This program is to adapt an existing helicopies to perform those functions. The helicopter will operate in air cavalry, attack helicopter, and field artillery units. In the antiarmor role the developmental system and attack helicopters will operate in close harmony as hunter/killer teams. In support of field artillery, the developmental system will provide conventional artillery spotting and precision laser designation for the COPPERHEAD. The program will provide a day/night target acquisition and laser designation capability through incorporation of a hast-Mounted Sight (MMS) into an existing airframe. The designed system will include space, weight, and power, as well as structural considerations to incorporate a Multipurpose Lightweight Missile (MLM) system to provide a suff-defense capability and the integration of an improved nap-of-the-earth communication and navigation system.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: The FY 1982 program provides for the minimum essential effort required for continuation of the full-scale engineering development of the near-term Scout helicopter/MMS integration initiated in FY81 and structured to achieve earliest possible initial operational capability (IOC). Requested funds will be used for Cabrication and initial hardware integration and contractor testing.

UNCLASSIFIED

H- 240

. . . .

••

Program Element: #6.42.20.A

DOD Mission Area: #255 - Tactical Surveillance

Title: Army Helicopter Improvement Program
Budget Activity: 14 - Tactical Programs

Hijor Hilestones Concept Pormulation Package Complete* Special Army Systems Acquisition Review Council/Office of the	Current Milestone Dates Oct 79	Milestone Dates Shown in FY 1981 Submission Oct 79
Secretary of Defense Program Review* ASARC Management	Nov 79/Dec 79	Nov/Dec 79
Review Request for Proposal (RFP) Release	Jul 80	Not Shown Not Shown
for Near-Term Scout Hellcopter (NTSH) NTSH Source Selection Evaluation	Jan 81	Not Shown
Board (SSEB)	Apr-Jun 81	Not Shown
Engineering Development Contract Award	Aug 81	Nov 81
Initial Operational Capability (100)	Mar 86	Jul 85

*Performed under Project D281, PE 6.42.03.A.

The program milestones have been realigned to accelerate full-scale engineering development contract award and optimize fully integrated systems approach to meet the near-term target acquisition/designation capability requirements. August 1981 contract award and March 1986 100 date could possibly be improved upon during upcoming contract negotiations following source selection when more definitive data are available. The change in IOC date from the FY 1981 submission was mandated by the time required to evaluate the potential airframe candidates and formulate a viable competitive acquisition strategy.

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

	PY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE	_				
Funds (current requirements)	0	25939	39373	94688	160000
Funds (as shown in FY 1981					
submission)	0	5023	38000	To be determined	To be determined
	HINC	LASSIFIED			
	5 11.5				11-241

Program Element: #6.42.20.A

DOD Mission Area: #255 - Tactical Surveillance

Title: Army Helicopter Improvement Program

Budget Activity: 14 - Tactical Programs

1981 - Increase of \$20.9M permits acceleration of development program initiation to permit the possibility of fielding of the Near-Term Scout Helicopter in a reasonable timeframe. Total estimated cost of \$160000 thousand is based on a preliminary Army cost estimate. A validated baseline cost estimate is planned for completion in July 1981.

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

	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Aircraft Procurement, Army Punds (current requirements) Funds (as shown in PY 1981	o	o	0		To be determine	d To be determined
submission)	Not Appli	cable				
Quantities (current requirements) Quantities (as shown in FY 1981	0	0	0	0	720	720
submission)					720	720

The Army will address the procurement funding requirements during the FY83-87 POM formulation.

UNCLASSIFIED

Program Element: #6.42.20.A

DOD Mission Area: #255 - Tactical Surveillance

Title: Army Melicopter Improvement Programs
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: In January 1974, Headquarters, Department of the Army approved a Required operational 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, the Army Systems Acquisition Review Council (ASARC) approved the need for the ASH 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 (DSARG) in September 1975. Both the Army and the Department of Defense concluded that some commonality between the ASH and potential future helicopters in the 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 ASN and approved development of a Target Acquisition and 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 AAH funds to provide for 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 the requirement as it was being updated. A special study group was also established to refine the specifics of the requirement and to thoroughly explore all candidate systems, and the ASH Project Office was reestablished L June 1979. This work was completed in October 1979. A special ASH ASARC on 30 November 1979 reaffirmed the Army's need for ASH. The special ASARC also looked at the affordability issue and acknowledged that the full ROC development program could not be supported under present funding constraints. Furthermore, the special ASARC determined that mast-mounted sight (MMS) technology is sufficiently mature to apply to an existing airf-The near-term program will furnish an organily needed capability that is compatible with the near-term attack helicopter fleet and provide a logical step moving 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 Aerial Scout program (Project D281) was cancelled by the Office of the Secretary of Defense (OSD) at the end of FY80 and effort redirected toward integration of a mast-mounted sight (HMS) on an existing Inventory airframe to continue under a new program element (PE #6.42.20.A) and title Army Helicopter Improvement Program. The OSD decision precluded new airframe development activity and withheld commitment for any procurement. After user-developer mission profile and MMS/detectability evaluations conducted Spring 1980 an ASARC Management Review in July 1980 approved a program to compete MMS development and integration on existing inventory airframes and to include performance improvements to enhance hover-out-of-ground-effect (HOGE) capability to meet worldwide deployability requirements.

G. (II) RELATED ACTIVITIES: Previous aerial scout program concept and program formulation efforts were conducted under program elements #6.32.05.A, Aerial Scout, and 6.42.03.A, Aerial Scout. A portion of PE 6.42.03.A, Aerial Scout, FY 1980 funding will be used to support initial phases of MMS development. Weapon systems being developed under elements 6.46.21.A and

UNCLASSIFIED

Program Element: #6.42.20.A DOD Mission Area: #255 - Tactical Surveillance Title: Army Helicopter Improvement Program
Budget Activity: 14 - Tactical Programs

6.43.10.A, Heliborne Missile - HELLFIRE, and program element, 6.46.21.A, COPPERHEAD, when required, will use the terminal homing guidance provided by the mast-mounted laser designator on the MMS helicopter.

H. (U) WORK PERFORMED BY: Prime contractor will be determined when source selection has been completed for the Near-Term Scout Helicopter. In-house developing organization: US Army Aviation Research and Development Command, St Louis, MO.

I. (U) PROGRAM ACCOMPLISHMENTS AND PUTURE PROGRAMS:

- 1. (U) PY 1980 and Prior Accomplishments: Covered under Program Element 6.42.03.A Projects 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: 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 28 July 1980. Also, included effort for the Army Helicopter Improvement Program (AHIP) Near-Term Scout Helicopter (NTSH) ROC, COEA, Procurement Plan and draft Request for Proposal (RPP) preparation.
- 2. (U) FY 1981 Program: Covered by Program Element 6.42.20.A., Army Helicopter Improvement Program, includes preparation and release of final RFP, Source Selection Evaluation Board (SSEB) effort, Army/OSD decision reviews, and award of initial Engineering Development (ED) contract.
- 3. (U) FY 1982 Planned Program: Continuation of Engineering Development (ED) contract; includes continuation of engineering design, fabrication and initial hardware integration and contractor testing of aerodynamic (MMS nonfunctional) prototype.
- 4. (U) FY 1983 Planned Program: Award of third increment to ED contract; includes system first flight, contractor flight testing, qualification and prototype delivery. Army will conduct preliminary airworthiness evaluation (PAE).
- 5. (U) Program to Completion: Award of final increment to ED contract; includes Productibility Engineering Planning (PEP), contractor testing and reporting. Army will conduct development testing/operational testing (DT/OT). Component production and airframe modification contracts will be awarded, leading to aircraft delivery and initial operational capability projected for late CY 1985.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.42.21.A

DOD Mission: #255 - Tactical Surveillance, Reconnaissance,

and Target Acquisition

Title: AN/UPD-7 Surveillance Systems
Budget Activity: #4 Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	520	0	4000	13200	18000	35720
D208	QUANTITIES AN'UID-7 Surveillance	520 1/	02/	4000	13200	18000	35720 3/

NOTES: 1 - This funding was contained in Program Element 6.42.01.A, Aircraft Avionics, Project DC95, Airborne Data Links in the FY 1981 Budget Request. The program has been transferred to a new Program Element to align it with the correct DOD Mission Area.

- 2 FY 1981 funding of \$4,335 thousand requested in the FY 1981 Budget for this program was deferred by Congress.
- 3 RDTE Program will equip one fielded OV-1D Detachment of six aircraft with four product-improved radar systems, two ground stations, and one set of ground support equipment.

Program Element: #6.42.21.A DOD Mission: #255 - Tactical Surveillance, Reconnaissance, and Target Acquisition

Title: AN/UPD-7 Surveillance Systems Budget Activity: #4 Tactical Programs

diction 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-SC N) program vill threat which the current system cannot enable the system to operate against the beyond the forward line of troops (FLOT) and most impordo, will extend the surveillance range out to the required tant, will provide continuity of surveillance by scanning the entire Corps area of influence every 90 seconds. The current system does not provide timely enough coverage of the Corps area of influence and adjacent flanks to insure that second-echelon forces do not enter the main battle area 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 Standoff Target Acquisition System (SOTAS) and PAVE MOVER as they are introduced into the force structure.

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

- 1. (U) PY 1982 funds are required to initiate 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 the procurement of long-lead components will be made to support system fabrication in FY 1983.
- (0) The FY 1981 request for this effort was deferred by Congress and is now being requested again in FY 1982. The FY 1981 deferment was based upon the battlefteld surveillance capabilities to be provided by developmental systems such as the Army Standoff Target Acquisition System (SOTAS) and Air Force TR-1 ASARS II, and PAVE MOVER. Since that deferment, the Army has done an extensive relook at the Corps Commander's surveillance requirements and the ability of other Army or Air Force developmental systems to satisfy these requirements. The initial conclusions drawn from this review are that the AN/UPD-7() electronically scanned (E-SCAN) system will meet a unique set of requirements and is still an urgently needed capability. This conclusion was supported by three separate formal statements of urgency for the AN/UFD-7() system from Eighth US Army, US Army Europe, and US Army Forces Command. This review will be continued during FY 1981 in the form of a "mini" Cost and Operational Effectiveness Analysis (COEA) to further reinforce the complementary and cost effectiveness of the AN/UPD-7() system as an integral part of the SOTAS, PAVE MOVER, and ASARS II "radar mix" on the battlefield.
- (ii) The total developmental costs shown in this summary are the result of a one-year detailed engineering analysis and program structuring executed by the Army during FY 1980. These costs were developed independently by Georgia Institute

Program Element: #6.42.21.A Title: AN/UPD-7 Surveillance Systems

DOD Mission: #255 - Tactical Surveillance, Reconnaissance, and Target Acquisition Title: AN/UPD-7 Surveillance Systems

Budget Activity: #4 Tactical Programs

of Technology, Arlanta, CA, and the US Army Combat Surveillance and Target Acquisition Laboratory, Fort Monmouth, NJ, and were done in cognizance of the restructuring of the Standoff Target Acquisition System (SOTAS) program funding requirements that occurred concurrent with this effort. Prior to the start of the Engineering Development (ED) program in FY 1982 the total development costs will be further validated by a baseline cost estimate to be accomplished in FY 1981.

4. Major Milestones:

	Current Milestone Dates:
Mini Cost and Operational	
Effectiveness Analysis	Jul 81
Baseline Cost Estimate	Jul 81
Antenna Proof Of Principle	
Demonstration	Jul 81
HQDA Engineering Development Decision	Aug 81
Engineering Development Contract Award	May 82
Developmental and Operational Testing	Sep-Dec 84
Interim Initial Operating Capability	
Production Award	May 85
Initial Operating Capability	

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

RDTE	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1891	520	0	4000	31200	35720
runds (as shown in FT 1891 submission)	595	4335	5955	0	13995

The FY 1980 funding decrease resulted from a reprograming of funds to higher priority Army requirements. The funding

Program Element: | 16.42.21.A | Title: AN/UPD-7 Surveillance Systems |
DOD Mission: | 1255 - Tactical Surveillance, Reconnaissance, and Target Acquisition | Title: AN/UPD-7 Surveillance Systems |
Budget Activity: 14 Tactical Program:

required for initiation of this program in FY 1981 was deferred by Congress. In addition, the total program cost shown in the FY 1981 submission was an early estimate of program RDTE requirements. During the past year the total system configuration was defined, and two independent cost estimates were made. The total RDTE program cost will be further validated during FY 1981 with a Baseline Cost Estimate of the total system.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	foral Est imated Cost
Aircraft Procurement, Army:	_		•••			
Funds (current requirements) Funds (as shown in FY 1981 submission)	0	0	300	15100 15479	102300 28479	117400 43958
Quantities (current requirements)						
Data Links				20	70	90
Radars					32	32
Ground Stations					24	24
Quantities (as shown in FY 1981 submission)						
Data Links				90	0	90
Radars					0	0
Ground Stations					0	0
Military Construction, Army:						
Funds (current requirements)					0	0
Funds (as shown in FY 1981			-*		0	0
submission)					- -	

Program Element: #6.42.21.A - Title: AN/UPD-7 Surveillance Systems

DOD Hission: #255 - Tactical Sutveillance, Reconnaissance, Budget Activity: #4 Tactical Program;

and Target Acquisition

The FY 1981 submission supported the procurement of an electronic countermeasures (ECM)—hardened data link for the AN/UPD-7 (APS-94F) program. The current requirements incorporate the same

as a part of program which also includes sufficient radars and ground stations to equip the active Army OV-1D fleet. The procurement funding requirements for the AN/UPD-7() (E-SCAN) were developed from two independent cost analyses accomplished in FY 1980 by the Georgia Institute of Technology, Atlanta, CA, and the US Army Combat Surveillance and Target Acquisition Laboratory, Fort Monmouth, NJ, and will be further validated during FY 1981 with a Baseline Cost Fatimate.

Title: AN/UPD-7 Surveillance Systems Program Element: #6.42.21.A DOD Mission: #255 - Tactical Surveillance, Reconnaissance, Budget Activity: 14 Tactical Programs and Target Acquisition

DETAILED BACKGROUND AND DESCRIPTION: In order to successfully conduct his mission of interdiction of the second echelon, the Corps Commander has the inherent requirement of being 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-SCAH), program will product-improve the current AN/UPD-7 (AN/APS-94F) Corps surveillance system to meet this requirement. The Army current tly has five Corps-level companies and two detachments of OV-ID, MOHAMK, 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 airborneradar (SLAR) is the main component. This system currently provides a valuable intelligence product to field sommanders on a daily basis, but does have several major The current AN/UPD-7 system requires up to to cover a typlto this lack of timely surveillance coverage of the Corps area, the system cannot maintain continuity (speed and direction) on moving targets it detects. This limited coverage will permit second-echelon forces to enter the Corps are not influence undetected. In addition both the AN/APS-94F radar and the data, link (AN/ARC-164(V)12) that connects the aftibrate sensor to the ground station will be

This program will product-improve the existing AN/UPD-7 surveillance system to correct these defictencies and meet the Corps Commander's radar surveillance requirements. Utilizing proven technology from other development programs, the radar will be electronically scanned to enable it to cover up to of the Corps Commander's area of influence every dar will be electronically scanned to enable it to cover up to of the Corps Commander's area of influence every seconds. This timely coverage will allow the Corps Commander to maintain continuity and track moving that gets as they advance into the main battle area. Current aircraft (OV-ID) assets are capable of maintaining this surveillance capability around the clock during hostilities and will allow the AN/UPD-7() system to one targeting systems such as Stundoff Target Acquisition System (SOTAS) and PAVE MOVER for direct engagement as the second-echelon forces move into range. At the same time the electronically scanned (E-SCAN) radar will be

This hardening will have the additional operational benefit of extending the current range of the AN/APS-94F to the range be oud the forward line of troops (FLOT) required by the Corps Commander. This program will also replace the existing AM/MPD-7 data link with an to provide a that is interoperable with the Division-level Standoff Target Acquisition System (SOTAS) ground terminal. This will be achieved by integrating the same data link that is being developed for SOTAS and the Army Remotely Piloted Vehicle (RPV) and will not involve the development of yet another new data link. Finally, the current AN/UPD-7 ground station will be replaced with a ground station that is functionally similar, if not identical, to the SOTAS Secondary Ground Station. This commeg is necessary to allow the surveillance information collected from the OV-1D, MOHAWK, to be displayed in near-realtime in the ground station on a cathode ray tube (CRT) and to allow software-controlled time compression of the tracks made by moving targets. This is the same technique utilized by the Interim Interim (12) SOTAS currently in operation in Europe. This cugineering

Program Element: #6.42.21.A

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

Title: AN/UPD-7 Surveillance Systems
Budget Activity: #4 Tactical Programs

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 Europe for an interim initial operational capability (IOC) in The program will then transition to a limited production of hardware to equip all the active Army OV-1D units. The AN/UPD-7() will have a production IOC of in Europe. 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 operational Effectiveness Analysis that will include the Standoff Target Acquisition System (SOTAS), PAVE MOVER, and ASARS 1). The initial results of this evaluation strongly support the need for the AN/UPD-7() as part of our "radar mix." SOTAS cannot ment the Corps surveillance requirements without a product improvement to the current engineering development system and additional procurement. This is neither timely nor cost effective. The Air Force ASARS II system does not meet the Corps commander's surveillance requirements in several major areas. ASARS II is a fixed target radar system, not a moving target system, and its range of beyond the forward line of troops (FLOT) falls short of the required moving target system, and its range of Additionally, AGARS II is sized to support four to five Corps in an Allied Tactical Air Force support area, and as such, cannot provide the continuous coverage required to maintain continuity on moving targets in a single Corps area of influence. PAVE MOVER is also an Allied Tactical Air Force asset or possibly even a Theater asset and must support four to eight Corps. This also will preclude it from providing dedicated support to a single Army Corps. With a primary mission of target acquisition and strike control for Assault Breaker, PAVE MOVER cannot provide continuous surveillance coverage to any one single Army Corps. As the PAVE MOVER feasibility test data, operational and organizational concept and fielding data become available, its cost and operational effectiveness to meet the Corps surveillance requirements will continue to be evaluated. All of these systems, Standoff Target Acquisition System (SOTAS), AN/UPD-7(), ASARS II, and PAVE requirements will con-MOVER, are designed and built to perform a unique function on the battlefield and operationally condement each other on the battlefield. In addition to performing the Corps commander's radar surveillance mission, the AN/OFC-7() will perform a valuable cueing function in support of the targeting capabilities of both SOTAS and PAVE MOVER.

G. 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 the content. This approach is technologically simple utilizing and demanded the proven during FY 1981 with a proof of principle demonstration. This effort will be accomptioned as a part of Program Element 6.37.19A, Surveillance,

Program Element: 16.42.21.A

DOD Mission: 1255 - Tactical Surveillance, Reconnaissance, and Target Acquisition

Title: AN/UPD-7 Surveillance Systems
Budget Activity: 14 Tactical Programs

Target Acquisition and Night Observation (STANO), Project DK72, Radar. The AN/UPD-7() will utilize either the Modular integrated Communications and Navigation System (MICNS) under development in Program Element 6.47.48.A, Standoff Target Acquisition System (SOTAS), and Program Element 6.47.30.A, Remotely Piloted Vehicle (RPV), or the L-80 Microwave Data Link developed for the TR-1 and Improved GUARDRAIL V programs. The ground station to be utilized for the AN/UPD-7 () capitalizes on the secondary ground control station currently being developed in Program Element 6.47.48.A, SOTAS, and will be either identical or a minimally modified version of that piece of equipment. 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 if 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) componed of members from the Army Standoff Target Acquisition System (SOTAS) program, Combat Surveillance and Target Acquisition Laboratory, Program Hanager for Special Electronic Mission Aircraft (SEMA), Headquarters, US Army Electronics Research and Development Command (ERADCOM), 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 MOVER 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 alread. If elded system will assure that these objectives are met.

H. (U) MORK PERFORMED BY: In-House: PM, Special Electronic Mission Aircraft, St. Louis, MO; US Army Electronics Research and Development Command (ERADCOM), Adelphi, MD; Combat Surveillance and Target Acquisition Laboratory (CS&T.), Fort Monmouth, NJ. Contractors: Engineering Experiment Station, Georgia Institute of Technology, Atlanta, GA; Molibu Research Associates, Santa Monica, CA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: During FY 1980 the Army (US Army Intelligence Center and S hool) 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-SCAN). The initial results of this analysis clearly delineated the benefits obtained from the improved AN/UPD-7() and showed how this system and SOTAS perform unique functions and complement each other. In parallel with this

Program Element: #6.42.21.A

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

Title: AN/UPD-7 Surveillance Systems
Budget Activity: #4 Tactical Programs

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 PAVE MOVER, ASARS II and SOTAS. All of these actions were reviewed at an HQDA decision briefing in October 1980. The results of this review are the FY 1981 and beyond program described below.

- 2. FY 1981 Program: During FY 1981, the trade-off analysis accomplished in FY 1980 will be expanded to a "mini" 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 AN/UPD-7() electronically scanned (E-SCAN) will be 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 (ECCM) approach will be 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 (ECCM) approach which is classified as a moderate risk. The proof-of-principle demonstration will eliminate the risk associated with this portion of the program. All of these actions will be reviewed at an HQDA decision briefing in August 1981 and a decision will be made on whether to proceed with Engineering Development with the AN/UPD-7() in FY 1982.
- 3. (U) FY 1982 Planned Program: Based on the previous two years' work and a successful review of this work by HQDA in August 1981, 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 (ECM)-hardened versions of the AN/APS-94F side-looking airborne radar, two ground sensor terminals with ECM-hardened 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
- 4. (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 will be initiated. If the Standoff Target Acquisition System (SOTAS) data link and secondary ground station have been selected for use in this system, this will be largely an integration effort vice developmental effort.
- 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 Europe in

[[-253

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.06.A
DOD Mission Area: #213 - Ground Air Defense

Title: STINGER

Budget Activity: #4 - Tactical Programs

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

Project <u>Number</u>	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 18827	FY 1981 Estimate 5833	FY 1982 Estimate 16171	FY 1983 Estimate To Be Dete	Additional to Completion rmined	Total Estimated Cost
i	QUANTITIES						208
D646	Stinger	18827	5833	16171	To Be Dete	rmined	

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for full-scale development of a Manportable Air Defense Weapon System (MANPADS). MANPADS is a self-defense, air defense weapon system needed at the company unit level to counter enemy low-altitude, high-speed tactical aircraft and helicopter threats to company-size units operating near the Forward 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.

An advanced solker, Passive Optical Seeker Technique (POST), was approved for engineering development in June 1977 to significantly improve Stinger's infrared counter-countermeasures capability.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: The programed full-scale development of the advanced seeker (FOST) will continue. Ground testing of the missile will be completed by the contractor as well as simulation validation. Foototype qualification Tests (PQT) by the quovernment, consisting of 16 rounds, will begin in FY 1982. The Stinger-POST final performance assessment will also begin during this period. Program costs and schedule are being analyzed to evaluate a possible growth in the program of approximately \$10 million because of the additional time required to complete testing and qualification related to the integration of the sealed head with the guidance electronics.

11-254 C1, 31 Mar 81

Program Element: #6.43.06.A DOD Mission Area: #213 - Ground Air Defense Title: STINGER
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Initiation of ED of the POST Secker	June 1977	June 1977
Completion of ED of POST Seeker	July 1982	June 1981
Initial Hardware Availability	December 1985	March 1983

The Stinger-POST engineering development program was extended because of difficulties encountered with producibility, integration/assembly and testing of the POST seeker head and packaged electronics. The Stinger-POST program is currently being analyzed to more accurately define the schedule impact.

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

		FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
	RD1 E					
1	Funds (current requirements) Funds (as shown in FY 1981	18827	5833	16171	To Be Determin	ned
'	submission)	1.7577	9945	0	0	204710

(1) In FY 1980 \$1.25M was reprogramed to conduct a special acquisition test in Germany. (2) FY 1981 funding was reduced by \$3.5M for the FY 1981 hudget amendment and by \$0.5M for the studies general reduction. (3) \$4M was added to FY 1982 to recoup the \$3.5M lost in FY 1981. An additional \$12M was included in FY 1982 amendment to resource the additional time required to conduct testing related to the integration of the sealed head with the guidance electronics.

UNCLASSIFIED

11-255 C1, 31 Mar 81

Program Element: #6.43.06.A

DOD Mission Area: #213 - Ground Air Defense

Title: STINGER
Budget Activity: #4 - Tactical Programs

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

Quantities (current requirements) 1874 1356 2544 To Be Determined 30 Quantities (as shown in FY 1981 submission) 2400 1356 1974 - 22215 30 Military Construction, Army Funds (current requirements) 3300 0 2914 - 0 Funds (as shown in FY 1981			FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Funds (as shown in FY 1981 submission) 81000 70800 168600 - 908700 136: Quantities (current requirements) 1874 1356 2544 To Be Determined 3: Quantities (as shown in FY 1981 submission) 2400 1356 1974 - 22215 3: Military Construction, Army Funds (current requirements) 3300 0 2914 - 0 Funds (as shown in FY 1981	1		81800	70600	224300	To Be Dete	rained	
Quantities (current requirements) 1874 1356 2544 To Be Determined 30 Quantities (as shown in FY 1981 submission) 2400 1356 1974 - 22215 30 30 300 2914 - 0 Funds (current requirements) 3300 0 2914 - 0 Funds (as shown in FY 1981 - 0 0 - 0 - 0 0 - 0 0 - 0 0 0	1							
Quantities (as shown in FY 1981 submission) 2400 1356 1974 - 22215 30 Military Construction, Army Funds (current requirements) 3300 0 2914 - 0 Funds (as shown in FY 1981		(noisaimdus	81000	70800	168600	-	908700	1368000
submission) 2400 1356 1974 - 22215 30 Military Construction, Army Funds (current requirements) 3300 0 2914 - 0 Funds (as shown in FY 1981	ı	•	1874	1356	2544	To Be Dete	rmined	30453
Funds (current requirements) 3300 0 2914 - 0 Funds (as shown in FY 1981			2400	1356	1974	_	22215	30453
Funds (as shown in FY 1981		Military Construction, Army						
		Funds (current requirements)	3300	0	2914	-	0	6214
eubnterton) 0 0 0 - 0		Funds (as shown in FY 1981						
printing to the contract of th		(notaatadua	0	0	0	-	0	0

Change in quantities in FY 1980 is the result of the FY 1980 contract negotiations. Other changes in the missile procurement program are due to economic changes resulting from application of new Department of Defense inflation guidance and tor Stinger-POS1 development and production schedule delays resulting in stretching out completion of the procurement program. Additional funding in FY 1982 resulted from estimating changes based on prior year contract experience. Hillitary construction in FY 1982 is to construct two moving target simulator buildings in Germany to support training of Stinger and Redeye teams. Procurement funding programed for FY 1982 includes purchase of the equipment for these building. Hillitary construction in FY 1980 was not included in this summary in the FY 1981 submission.

UNCLASSIFIED

11-256 Cl, 31 Mar 81

Title: STINGER Budget Activity: #4 - Tactical Programs

DETAILED BACKGROUND AND DESCRIPTION: The currently fielded Redeye Guided Missile System exhibits serious limitations in view of the current and postulated threat posed by enemy support and interdiction jet aircraft. Redeye can attack

Furthermore, Redeye has no identification, Friend or Foe (IFF) capability. The purpose of this program is to produce, test, and field Stinger as the successor to Redeye, and to develop, test, and field the follow-on Stinger-POST seeker with improved counter-countermeasures to meet advanced countermeasures threats. As a successor to Redeye, Stinger will overcome the above

cited deficiencies by being capable of engaging threat aircraft from any aspect at speeds

Stinger will provide an integral air defense capability to the combat maneuver company complemented by PATRIOT, RULAND, and DIVAD GUN in the overall air defense of the field Army. Stinger will be deployed with both Army and Marine Corps forward combat elements and is expected to replace Redeye generally on a will be deployed with both Army and Marine Corps forward combat elements and is expected to replace Redeye generally on a one-for-one basic. Stinger is similar to Redeye in that it is a shoulder-fired, passive infrared homing guided missile system. Stinger has a higher performance rocket motor, an advanced seeker, a separable reusable gripstock, a new launcher, and a lightweight identification, Friend or Foe (IFF) device. The total weight of the missile and its launcher in the ready-to-basic-fire configuration is 33.9 pounds. The fire unit is a two-man team and is authorized a basic load of six missiles with six additional missiles in theater stocks. The Stinger-POST advanced seeker has demonstrated the feasibility of a two-color (infrared and ultraviolet) design which has a significantly enhanced counter-countermeasure capability. Full-scale development of POST began in FY 1977.

- G. (U) RELATED ACTIVITIES: This program is a joint development with the United States Marine Corps. Production requirements for that service are fully coordinated with the Army. The program is monitored for the Marine Corps by a Marine Corps officer assigned to the Stinger program office, Redstone Arsenal, AL, and through coordination by the Army Staff with their Marine Corps counterparts.
- H. (U) WORK PERFORMED BY: Development of the Basic Stinger System and the POST seeker is under the direction of the US Army Missile Command, Muntsville, AL. The prime contractor is the Pomons Division of General Dynamics, Pomons, CA. Atlantic Research Corporation, Gainesville, VA, is the developer of the rocket motor. The IFF prime contractor is Teledyne Electronics, Newbury Park, CA. Government agencies which will contribute during the development phase are the US Army Armament Research and Development Command, Dover, NJ (missile warhead), and the US Army Electronics Research and Development Command, Fort Monmouth, NJ (battery).

Title: STINGER

Budget Activity: #4 ~ Tactical Programs

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

FY 1980 and Prior Accomplishments: In 1965, a series of advanced development efforts were begun to demonstrate the critical components required for an improved, shoulder-fired air defense missile which would engage low flying aircraft from any engagement aspect flying at speeds up to

The effort demonstrated through firings at jet aircraft targets
that such commonents were feasible. In June 1972 Stinger entered formal Engineering Development. The Easeline design was completed in 1974. A cost reduction effort entitled STINCTHRIFT was implemented in CY 1974 resulting in an estimated \$23 million savings in procurement. In FY 1975 the Guided Test Vehicle (GTV) series of tests were completed with positive indications of system performance criteria being met. A total of 16 GTV firings demonstrated a success rate against threat representative targets. A design flight test program (18 rounds) was conducted to confirm parameters. Producibility Engineering Planning (PEP) was initiated which provided delivery of Special Acceptance Inspection Equipment and drawings for the initial Production Facilities (IPF). In FY 1976 and FY 1977, further tests continued with the Prototype Qualification Tests-Contractor (PQT-C). These flights determined that the contractor met his contract specifications. The government initiated Prototype Qualification Test-Covernment (PQT-C) to evaluate system performance independently against requirements. There were 35 flights conducted in Prototype Qualification Test-Government (PQT-G) under varying environmental conditions. The US Army Operational Test and Evaluation Agency (OTEA) also tested the system (Operational Test if; with both nonfiring tactical exercises and with troops firing a total of li rounds. An I8-round Production Prototype Test initiated in July 1977 was successfully completed in November 1977. Stinger arctic testing by US Army Test and Evaluation Command (TECOM) was completed in February 1978, and Producibility Engineering Planning (PEP) was essentially completed in September 1978. A production Technical Data Package (TDP) adequate to support initial production was completed in December 1977. This production TDP consists of documentation defining the product (tactical system and ancillary equipment), Special Acceptance Inspection tonsists of decomendation defining the product (active system an ancircly equipment), operation methods planning data, and tooling design. SAIE to support production of the warhead section was completed in July 1978. Stinger initial Production was begun in April 1978. Initial deliveries from the first production contract were made in March 1980 for use in the initial production firings and for instructor and key personnel training. Technical difficulties related to production and training firings and to delays encountered in hardware qualification testing caused the August 1980-10C to be delayed. Qualification testing has now been completed, and technical problems either have been solved or modifications are now being incorporated. The system meets its designed system effectiveness. 10C was lattained on 27 February 1981. A counter-countermeasures improved seeker (POST) full-scale development effort was initiated 28 June 1977 after favorable Army Systems Acquisition Review Council (ASARC) and Office of the Secretary of Defense (OSD) decisions. The design for the final configuration of the POST seeker has been completed. Engineering Ivaluation Testing (EET) is underway. Fabrication of the first flight configuration hardware was initiated. Design trade off studies and a preliminary performance assessment have been completed. Fabrication, and ground and laboratory testing of prototype hardware continues as will Producibility Engineering Planning (PEP) activities.

11-2'3 C1, 31 Mar 81

Program Element: #6.43.06.A
DOD Mission Area: #211 - Ground Air Defense

Title: STINGER
Budget Activity: #4 - Tactical Programs

- 2. (U) FY 1981 Program: Engineering Development of POST will continue in FY 1981. System simulation activities include computer simulation validation and pre- and post-flight analyses. The 13-round contractor flight testing of Stinger-POST will be initiated; ground testing of the POST missile will also continue.
- 3. (U) FY 1982 Planned Program: Engineering development activities include completion of simulation validation and contractor ground testing. The 16-round government Prototype Qualification Tests (PQT) flight testing will be conducted in FY 1982. The POST final performance assessment will be completed.
 - 4. (U) FY 1983 Planned Program: None.
 - 5. (0) Program to Completion: None.

UNCLASSIFIED

1-259 - - 01, 31 Mai 81

Title: STINGER

Budget Activity: 14 - Tactical Programs

J. (II) TEST AND EVALUATION DATA:

- Development Test and Evaluation: In June 1972, Stinger entered formal Engineering Development. The baseline design was completed in 1974. In July 1975, the Guided Test Vehicle (GTV) series of tests was completed. A cotal of 16 GTV firings were conducted to test the missile guidance against various targets and test conditions. The test resulted in 10 successes and 6 failures. The root causes of the failures, detector warm-up and system noise, were corrected by the contractor. A design flight test program consisting of 18 rounds was completed in January 1976 to confirm missile performance characterism tics when shoulder-fired and after temperature conditioning. There were 12 successes, 4 failures, and 2 no-t st. The failures were due to tailfin failures in a hot environment (2 rounds), wet launch motor, and a short in a battery cool in unit; all deficiencies were corrected. Prototype Qualification Testing (PQT) by the contractor began in Pebruary 1976 and was suspended in March 1976 after 6 missile firings and laboratory environmental tests indicated quality control problems and unsatisfactory There were 21 successes, I failure, and 4 no-test. These tests verified that the system met the specifications and requirements of the contract and that the system was prepared to begin government testing. Thirty-five missiles were fired in the Prototype Qualification Testing by the government; testing was completed in April 1977, with 26 successes and 9 no tests. A Production Prototype Test consisting of 18 flight tests was conducted from June through November 1977 with 14 successes, 2 no-tests, and 2 failures. The failures were isolated to a faulty missile umbilical and a broken wire in the varhead section. A cold region test was conducted at Pt Greely, Alaska, from January to Pebruary 1978. Testing included cold temperature storage, field handling and transportation, a firing phase and an operational tracking exercise. Results of the field handling testing indicated a need for better sling design. The firing phase resulted in two eject-only failures of four missiles fired, and the tracking exercise revealed operational problems with the identification Friend or Foe (:FF). Corrective action has been taken on all problems. DT&E for basic Stinger was completed in February 1978. The required system round reliability was the demonstrated reliability was This high reliability supported the certified round maintenance concept. Stinger has proceeded into production.
- (U) Development Test and Evaluation (DTSE) for Stinger-POST started in PY78 and is expected to be completed in PY 1983. Stinger-POST is an improvement to the basic Stinger seeker head assembly and guidance electronics assembly which enhances the counter-countermeasure capabilities of the basic system. The program is managed by US Army Missile Commund, Reduction Arsenal, AL.
 - (U) DT&E for Stinger-POST includes a comprehensive program of ground testing, simulation, and flight testing.

11-260

.

•

Title: STINGER
Budget Activity: #4 - Tactical Programs

- (U) Testing by the contractor, Pomona Division of General Dynamics Corporation, is being performed on two versions of the guidance section: a guidance verification (GV) configuration and a counter-countermeasure verification (CCMV) configuration. The GV assembly is the POST guidance section less a portion of the counter-countermeasures circuitry. The CCMV assembly is the complete POST guidance section assembly. This technique was devised to allow the development and evaluation of the new POST guidance system, which uses state-of-the-art microelectronics and microprocessors, while concurrently developing the CCM circuitry. Identical tests will be performed on both configurations during contractor testing. The CCMV version will be the prototype.
- (U) Reliability testing, which began in June 1980, is designed to isolate and eliminate the root causes of malfunctions by subjecting the hardwire to increasingly severe environmental tests (step stress) and to determine safety margins. Flight vibration, transportation vibrations, launch shock, and combined environments of temperature/vibration and temperature/launch shock are some of the stresses to be applied. The required system reliability is the same as for basic Stinger.
- (U) Performance assessments using a flight test-validated computer simulation will evaluate the hardware design and establish the Stinger-POST performance capabilities and lethality against the full range of threat speeds, mancuvers, and countermeasures. The simulations are scheduled to be completed in CY 1982.
- (U) Plight testing for Stinger-POST will be conducted at White Sands Missile Range (WSMR), NM, to verify system performance against various targets and to provide data to validate computer simulation. A total of 29 flight tests are planned. The contractor will fire 13 Guidance Test Vehicles (GTV) (5 GV and 8 CGMV vehicles), beginning in FY81. Six of the GTV's will be preconditioned at extreme temperatures. Prototype Qualification Tests (PQT) by the government, consisting of 16 rounds, will begin in late-1981. Ten rounds will undergo environmental preflight conditioning; six rounds will be fired under ambient conditions. All support equipment will be available during the test.
- (U) Several special tests will also be performed. Supersonic sled tests were conducted by the contractor on the GV configuration from March through June 1980 at China Lake, CA. Fly-by tracking tests of the GV were completed in September 1978. Initial CCMV fly-by tests were conducted at Ft. Bliss, TX, in January 1980, and special CCMV tracking tests were conducted in Germany during February and March 1980. Electromagnetic radiation tests are scheduled for late 1980 at Redstone Arsenal, AL. The Office of Missile Electronic Warfare (OMEW) is conducting an independent countermeasures and vulnerability analysis of the Stinger-POST guidance assembly. OMEW will provide suggestions for countermeasure improvements as the program progresses. Countermeasure devices will also be developed for subsequent use in the flight test program.

Title: STINGER
Budget Activity: 44 - Tactical Programs

- 2. (0) Operational Test and Evaluation:
- (U) Operational Test and Evaluation (OT&E) for basic Stinger has been completed; no significant deficiencies were noted and the system has proceeded into production.
- (U) Operational Test I was not conducted. Instead, the US Army Operational Test and Evaluation Agency (OFEA) monitored the contractor demonstration at Pt. Bliss, TX, during Mar-Jun 75. The contractor demonstration verified the capability of Stinger in the areas of human factors, weapon performance effectiveness, preliminary weapon system reaction times, and associated command, control, and communications doctrine.
- (II) Operational Test II (OT II) for Basic Stinger was performed by the OTEA in Aug 76 for the field exercise portion and Oct 76 for the live firing portion of the test. Eleven rounds were fired with 5 hits and 6 misses. Four of the misses wire due to gunner error; one failure was due to reliability; and one because the target exceeded the kinematic capability of the system. The Stinger Weapon System was evaluated during OT II in terms of performance against Redeye Weapon System, which was used as the baseline. The conclusions that supported the production decision were:
- (U) The Stinger Weapon System has a substantial forward hemisphere capability which can engage targets from all aspects. Redeye engages targets in an outgoing or crossover aspect only.
- (U) Functional operations of the Stinger Weapon System are basically the same as those of the Redeye Weapon System. Stinger operator errors, when they occur, are similar to those made by Redeye operators.
- (U) Stinger possesses an Identification Friend or Foe (IFF) system which is adequate when used as an aid for identification. Redeye does not have an IFF capability.

Infrared countermeasures are less effective against the Stinger Weapon System than against the Redeye Weapon System. However,

(U) Operational testing for Stinger-POST is scheduled concurrently with the government-conducted prototype quartification test (PQT/DT II) in CY 1982. A separate operational field/tracking exercise will be conducted by the OTEA it Nellis AFB, NV.

Title: STINGER
Budget Activity: #4 - Tactical Programs

The field exercise will be conducted to evaluate gunner training and operational aspects of the system in a benign and countermeasures environment. Six Tracking Head Trainers and a moving target simulator will be available for the operational tests. Six live firings will be conducted by OT gunners as part of the PQT/DT II firing program. These will be joint DT/OT firings. OTE testing will be completed by early CY 1983.

3. (U) Initial Production Testing:

- a. (U) Production missile flight tests consist of six First Article Test (FAT) weapons and a sample of 20 weapons for reliability assessment from the FY78 production contract. The first of the reliability samples was delivered in March 1980 and flight testing started immediately thereafter.
- b. (U) in July 1980 the six FAT weapons, after having been exposed to simulated life cycle environments, were fired. Firings were performed at extreme operating temperature limits (hot and cold). Five of these weapons performed successfully and one resulted in an eject-only only failure. Analysis of this failure revealed a disconnected flight motor lampard (a breakwire safety circuit designed to prevent flight motor ignition prior to launch motor separation in flight). Failure mode was random and attributed to inadequate quality control during assembly. Corrective action has been taken to preclude recurrence. The First Article Test results were contractually acceptable.
- c. (U) The 20 weapons comprising the reliability test series are randomly selected from periodic production deliveries. The 15 reliability flights conducted to date began March 1980. The first of these successfully impacted the subscale target and all flight test objectives were met. The next two firings were eject-only missile fattures and the flight testing was suspended. It was determined that incompatability had developed between missile battery voltage rise characteristics and fuze input requirements causing a timing error between May 1980 which resulted in two successful firings. Ten additional missiles were fired during November and December 1980. Of these 10 missiles, one was "no-tested" due to launch without acquisition (gunner error) leaving nine scorable flights. Seven of the nine were successful and two failures occurred. One failure was an open circuit in the missile battery which will be precluded from recurrance by screening all manufacturing and inspection procedures. A second failure occurred when a missile went ballistic (no apparent guidance).
- d. (U) The total production missile flight test experience to date includes the contractual flight test noted above, plus those flights conducted in troop training exercises. Several additional failures have occurred in these early training flights and immediate corrective actions were implemented. The only problem wherein the root cause has not been identified is

Title: STINGER Budget Activity: 14 - Tactical Programs

the early detonation of the warhead. This failure has occurred three times with warheads using very early production fuzes. The last 10 missiles fired utilized fuzes from later production cycles with no recurrence of the early detonation failure. Fuze improvements have been identified and will be tested in early CY 1981. Following proof testing, there improvements will be incorporated into the second production missiles.

e. (U) The many successful firings include shots against stationary, high speed and maneuvering targets as well as targets employing infrared countermeasures and a target executing a maneuver in combination with infrared countermeasures. The demonstrated accuracy of all successful flights is 100 percent; i.e., all have been physical or tactical hits. The demonstrated system effectiveness exceeds requirements. A total of 20 reliability sample firings are required to meet contractual requirements and to establish weapon reliability and system effectiveness. Data from these firings will also support a "Suitability for Release for Issue" statement prior to IOC. The five remaining reliability sample firings are scheduled in January 1981, and Stinger IOC has been rescheduled for the second quarter FY 1981.

System Characteristics:

Operational/Technical Characteristics 1/

Demonstrated Objectives Performance

Intercept Range 2/ Minimum (meters) Maximum (km) Intercept Range 900 Offset 3/ Hinlaum (ka) Maximum (km) Intercept Altitude Maximum (km) 4/ Maximum Acquisition Range No Offset (km) 5/ Activation Time (Secs) 7/

System Effectiveness (Es) 8/

Title: STINGER
Budget Activity: 14 - Tactical Programs

Infrared Countermeasures (Performance Degradation %) 9/ 10/ Weapon Reliability IFF Maximum Instantaneous Ready-to-fire weapon weight Including Onboard IFF antenna (1bs) 16 +5 35 34.4 (34.8)*

* Number in parentheses reflects current estimate (CE) for POST program.

** Based on PQT-G/OT II/PPT test results and production testing will be updated pending completion of production firings.

Title: STINGER Budget Activity: #4 - Tactical Programs

Summary: (U) Current performance values are based either upon prototype hardware or analyses using the fin 1 performance assessment (PA #4) computer simulation models of the missile and threat.

FOOTNOTES:

- (U) Decision Coordinating Paper (DCP) threshold allows 20% degradation for items 1 thru 7 and system read, to-fire weight. Kinematic performance, no offset. Minimum intercept range varies with target speed and missile launch angle relative to the threat aircraft flight path. The values reported are derived from computer analyses. Minimum range is for directly incoming targets at speeds between Maximum range is for a zero-speed target. The current estimate (CE) for POST for maximum intercept range is based on analysis of preliminary POST data and will be updated after future POST analyses.

 The 90° offset intercept ranges are based on Stinger or preliminary POST data and will be updated.
- nary POST computer simulation. The current estimate for POST will be updated following future POST computer analyses.

31

- 6/ (U) The CE for Stinger is based on measurements in ideal environments. CE for POST is based on worst case ambient temperature sensitivities at 23km visibility.
- 7/ (U) Time to ready-to-fire status.

 8/ (U) E = Preuse reliability x prefire reliability x firing reliability x missile lethality for K kills. Not included in this definition of E is the probability of detection, evaluation, and transfer (Pdet). For the purposes of engineering development, the performance of the gunner will not degrade this probability. Includes non-IRCM maneuvering and nonmaneuverving targets only and uses TACOS weighting (crossing emphasized).
- Although current estimate for Basic Stinger is as shown,
- 107 pared to the approved program E_, i.e., Degradation is calculated as the percent decrease in system effectiveness (E) in a countermeasures environment comin a benign environment.
- 12/ (U) Prefire reliability x fire reliability x warhead deconation reliability.
- 17/(U) Characteristic is not specified by the DCP. Search sector is +6° from the antenna line of sight.
- 14/ (U) Design changes are being made to the POST seeker optics which require the seeker dome to have a larger radius of curvature. This results in a more blunt dome shape that will cause missile aerodynamic drag to be increased. The increased drag will cause the maximum intercept range to be less than the CE. The CE will be updated following future simulation analyses.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.07.4

DOD Mission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

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

Project		FY 1980	FY 1981	FY 1982	FY 1983	Additional	Total Estimated
Number	Title	Actual	Estimate	Estimate	Estimate	To Completion	Costs
1	TOTAL FOR PROGRAM ELEMENT	128718	75375	57991	To Be Dete	rmined	
D212	Patriot (SAM-D)	126218	53074	27972	To Be Dete	rmined	
D213	Patriot (ECCM Enhancement)	_	19573	28058	To Be Dete	rmined	
D291	Patriot (NATO)	2500	2728	1961	To Be Dete	rmined	

B. 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 Pitriot 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 probability capable of operation in an Electronic Countermeasures (ECM) environment, and able to conduct multiple sin leons 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 (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 Committee (PSC) and a full-time management study group for the period Oct 78-Oct 81 to study the acquisition of Patriot by these

11-267 Ct, 31 Mar 81

Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

nations. Patriot Electronic Counter Countermeasures (ECCM) Enhancement (Project Number D213) has been initiated upon recommendations of the Defense Science Board to cope with the

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

(U) Project D212 - Development and modification of hardware and software which is needed to adapt Patriot's inherent growth capacity to evolutionary advancements in technology will continue. Efforts include continued development and testing of the Antenna Mast Set (AMS), the counter Antiradiation Missile (ARM) program and the Maintenance Enhancement Program (MEP).

Project D213 - Continue Jesign and testing of Patriot System enhanced capabilities in the following access:

Project D291 - Continuation of ongoing technical/management 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	Jun 80
Limited Production Decision DSARC [[]	Sep 80	Not Shown
Completion of Prototype System		
Confirmation Test	Oct 81	Not Shown
Delivery of 1st Production Fire Unit	Feb 82	Not Shown
First Battalion (FORSCOM) Activation	May 82	Not Shown
Complete Production Confirmation Test	Sep 82	Not shown
First Battalion (USAREUR) LOC		Not Shown

Program Element: #6.43.07.A
DOD Mission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

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

	FY 1980	FY 1981	FY 1982	FY 1983	Total Additional To Completion	Estimated Cost
RDFE			,			
Funds (current submission) Funds (as shown in FY 1981	128718	75375	57991	To Be Dete	rmined	
submission)	128710	51624	28699	Nut Shown	42867	1902072

The additional funds are required to support the planned product improvement program for PATRIOT which will begin in FY84. This program will include production engineering of all the ECCM enhancements selected for incorporation in the system.

E. (0) OTHER APPROPRIATION FUNDS: (\$ in thousands)

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
Missile Procurement, Army Funds (current requirement) Funds (as shown in FY 1981)	395950 395950	442300 <u>1</u> / 469600	820800 <u>1</u> / 575200	To Be Dete Not Shown	rmined 2004800	4092350
submission)						

UNCLASSIFIED

11-269 C1, 31 Mar 81

AD-A101 306 DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/6 5/1 DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT TEST & EVALUA--ETC(U) JAN 81 UNCLASSIFIED NL 4 or 6

Program Element: #6.43.07.A
DOD Mission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Toral Estimated Costs
Quantities (current requirement)		5 <u>2</u> /	2/			
Fire Control Sections	5	5 = '	12 2/	To Be Deter	rmined	
Missiles	117	130	364	To Be Dete	rained	
Quantities (as shown in FY 1981 submission)						
Fire Control Section	5	12	18	Not Shown	68	103
Hissiles	155	183	391	Not Shown	2907	4273
Military Construction, Army						
Funds (current requirement)	0	0	42200 3/	66004	214048 3/	322252 3/
Funds (as shown in FY 1981			<i>2</i> ,		2,	
submission)	3800	0	42000	Not Shown	0	0

- 1/ (U) Cost increases caused by reduced production rate for FY81 & 82, OSD directed test program for FY81 & 82, and revised production cost estimates from negotiation of FY80 production contract.
- 2/ (U) Reductions in production quantities directed by OSD in SECDEF Decision Memo from DSARC 111, 10 Sep. 30
- 3/ (U) Increases in Military Construction, Army (MCA) are added requirements for deployment of Patriot to UN-Army Europe (USAREUR) and US Army Forces Command (FORSCOM). NATO infrastructure Funds will also be used for construction of operating facilities in USAREUR.

UNCLASSIFIED

Program Element: #6.43.07.A DOD Mission Area: #213 - Ground Air Defense Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

- F. (i) 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 capibility 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 engagement 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 (TVH)) systems.
- G. (1) <u>RELATED ACTIVITIES</u>: 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-TSQ-7)). It will also be interoperable with the Air Force or Marine Corps systems when the Group/Brigade-level AN/TSQ-7) is not available.
- II. (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, is developing 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 1980 and Prior Accomplishments: The project was initiated as the Army Air Defense System for the 1970's (AADS-70's) in 163. The program was 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 Jesigned, fabricated, and tested in the Advanced Development program. This program proved the ability of the multifunction phased array radar to

UNCLASSIFIED

Program Element: #6.43.07.A 900 Mission Area: #213 - Ground Air Defense Title: Patriot (SAM-D)

Budget Activity: #4 - Tactical Programs

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 was approved in December 1972 which recommended: deletion of the nuclear warhead, programing of reduced number of tire sections for Continental United States (CONUS) air defense, and development of an improved numuclear 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 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 having Council (DSARC) met to approve the reoriented program. Ongoing efforts remaining after the stop work order were in support of the Track-Via-Missile (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 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. The remaining missiles were used to obtain additional engineering data. An Army Systems Acquisition Review Council (ASARC) was held in January 1976 which directed the resumption of Pull-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 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 (MSMR) 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. FU-3, -4, -5 were used at WSMK for training, support, and DT/OT II Tests during FY80. 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 pro-The contract period of performance has been extended to March 1981 to include producibility engineering and planning (PEP), the Counter-Antiradition Missile (ARM) Program, and the Maintenance Enhancement Program (MEP). The PEP contract was initiated in October 1977 to produce the manufacturing data package, to complete quality assurance plans, and to design special tooling and test equipment necessary to go into the production phase. The initial production facilities (IPF) contract was signed in Morch 1979 to purchase long-lead special tooling and special test equipment necessary to support a production decision on the Patriot Program in FY 1980. The second IPP contract was awarded in April 1980 to acquire, in conjunction with IPF buy 3 (FY-81), the remaining IPF entitles necessary to establish an initial production capability.

UNCLASSIFIED

Title: Patriot (SAM-D)
Budget Activity: 44 - Tactical Programs

scheduled award date for IPF buy 3 is in the second quarter of FY81. Following DSARC III SECDEF authorized Patriot to begin limited production. The production program was initiated on 1 Oct 80 when the contract was awarded for 5 fire units, 155 missiles, and other associated support equipment.

- 2. (U) FY 1981 Program: Tests planned during FY81 include the system environmental qualification test program, component tests, system performance tests, missile firing tests, tactical software reconfirmation testing, and Advanced Development ARM Decoy tests. Extensive testing of maintenance diagnostic software will be conducted to demonstrate improvements in fault detection and isolation capability.
- 3. (U) FY 1982 Planned Program: Tests planned to be completed during FY82 include software Tactical Build Set 2 System testing, component design confirmation, system design confirmation, and Follow-on Evaluation I. Software Tactical Build Set 2 formal tests, Follow-on Evaluation II and Production System Environmental Qualification tests are planned to begin in FY82. Three sets of tactical hardware will be used to form the first tactical half-battalion which will be activated at Ft Bliss, Texas, as a training unit. Testing of maintenance diagnostic software will continue, and development of maintenance support test equipment will begin.
- 4. FY 1983 Planned Program: Tests planned to be completed during FY83 include Software Tactical Build Set 2 formal tests, Follow-on Evaluation II, ARM Decoy Prototype tests and Production System Environmental Qualification tests.

 Training of the first half-battalion for Europe with deployment planned for early

 Development and testing of maintenance support equipment will continue.
- 5. Program to Completion: Complete system ECCM enhancements for incorporation into planned production schedules. The US will assist in the development of any US/NATO Patriot cooperation program. Production contracts will be executed until the currently programed number of fire units are completed. Starting in FY84, development of several major product improvements will begin. These improvements will provide the system with added capabilities to counter the and also provide improved reliability and maintainability. It will also provide funding to continue updating and improving system tactical software and continue interoperability testing with other Army, Navy, Marine Corps, and Air Force air defense systems.

Cl-273 Cl, 31 Mar 81

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D212 Program Element: #6.43.07.A DOD Mission Area: #213 - Ground Air 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 sir defense. In the field Army Patriot defenses will be complemented by short-range, low-allitude 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 target... 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-vi.-aissile (TVN) 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 beforse Command and Control System (AN/TSQ-73). It will also be interoperable with the Air Force or Marine systems when the Group/Brigade level AN/TSQ-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 Huntaville, AL, is a subcontractor for the rocket motor. Teledyne Brown, Huntaville, AL, is the Softwara Verification and Validation contractor; Science Applications incorporated, Huntaville, AL, has developed a Tactical Operation Simulator (TOS); Sanders Associates, Nashua, NH, is

11-274

. .

Project. #D212

Program Element: #6.43.07.A

DOD Mission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

developing an Operator/Tactica Trainer (OIT). Government agency in-house work is managed by the Patriot Project Management office, Huntsville, Al.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

(U) FY 1980 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 Hay 1967. SAM-D hardware was designed, fabricared, and tested in the Advanced Development program. This program proved the ability of the multifunction phase 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 Harch 1972. The SAM-D Nuclear and Antimissile Capability Study was approved in December 1972 which recommended: the nuclear warhood; programming 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 (TVH) guidance principle. 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 TVM 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 in the following areas: preparation for the TVM demonstration in the following areas: ation 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. The remaining missiles were used to obtain additional engineering data. An Army Systems Acquisition Review Council (ASARC) was held in January 1976 which directed the resumption of fuil-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 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

UNCLASSIFIED

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

accelerate the Engineering Development (ED) Program. The contractor test program from 2 Dec 76 to 16 Jun 60 has completed thirty-six missile firings. FU-3, -4, and -5 were used at White Sands Missile Range (MSMR) for training, apport and DT/OT 11 during FY80. Nine DT 11 firings and nine OT 11 firings were conducted from 22 Aug 79 to 21 Jul 80. We alts of these tests were used to support the DSARC III Production decision. The contract period of performance has been extended to Mar 81 to include producibility engineering and planning (PEP), the counter Antiradiation Missile (ARM) Program, and Maintenance Enhancement Program (MEP). 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 phase. The initial production facilities (1PF) 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. On 10 Sep 80 the SECDEF Decision Memorandum was signed authorizing limited production of Patriot.

- 2. (U) FY 1981 Program: Tests planned during FY81 include the system environmental qualification test program, component tests, system performance tests, missile firing tests, tactical software reconfirmation testing, and Advanced Development ARM Decoy tests. Extensive testing of maintenance diagnostic software will be conducted to demonstrate improvements in fault detection and isolation capability.
- 3. (U) FY 1982 Planned Program: Tests planned to be completed during FY82 include software Tactical Build Set 2 System testing, component design confirmation, system design confirmation, and Follow-on Evaluation I. Software Tactical Build Set 2 formul tests, Follow-on Evaluation II and Production System Environmental Qualification tests are planned to begin in FY82. Three sets of tactical hardware will be used to form the first tactical half-battalion which will be activated at Ft Bliss, Texas, as a training unit. Testing of maintenance diagnostic software will continue and development of maintenance support test equipment will begin.
- 4. FY 1983 Planned Program: Tests planned to be completed during FY83 include Software Tactical Build Set 2 formal tests, Follow-on Evaluation 11, ARM Decoy prototype tests, and Production System Environmental Qualification tests. Training of the first half-battalion for Europe with deployment planned for early

 | Development and testing of maintenance support test equipment will continue.
 - 5. Program to Completion: Production contracts will be executed until the currently programed number of fire units are completed. Starting in FY84 development of several major product improvements will begin. These will include: a new

11-276 C1, 31 Mar 81

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

bubble memory storage unit to replace the current mechanical recovery storage unit; a
an automated emplacement system; upgraded missile on-board processor; improved warhead; radar control improvements; improved missile fuze and improved launcher power generator. Funding of engineering development tests and production engineering of these improvements is included in the cost estimates.

Major Milestones:

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1981 Submission
Completion of DT/OT Testing	Aug 80	Jun 80
Limited Production Decision DSARC 111	Sep 80	Not shown
Completion of Prototype System Confirmation Test	Oct 81	Not shown
Delivery of 1st Production Fire Unit	Feb 82	Not shown
First Battalion (FORSCOM) Activation	May 82	Not shown
Complete Production Confirmation Test	Sep 82	Not shown
First Battalion (USAREUR) 10C	-	Not shown

7. (U) Resources (\$ 1n thousands):

RDTE	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Funds (current requirements) Funds (as shown in FY 1981	126218	53074	27292	To Be Det	ermined	
submission)	125718	29132	0	Not shown	0	1804114

II-277 C1, 31 Mar 81

Project: #D212
Program Element: #6.43.07.A
DOD Mission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimate Cost
Quantities (current requirements) Quantities (as shown in FY 1981 submission)	Not Applic					
Other Appropriations:						
						Total
Missile Procurement, Army:		1/	1./		2/	2/
Fund (current requirements)	395950	442300 <u>1</u> /	8208001/	902200	3340900 ² /	5 9 02150 ² /
Funds (as shown in FY 1981 submission)	395950	469600	575200	Not Shown	2004800	4092350
Quantities (current requirements)		2/	21			
Fire Control Sections (FCS)	5	<u>52</u> /	12 <u>2</u> /	18	63	103
Missiles	117	130	364	465	3197	4273
Quantities (as shown in FY 1980 submission)						
Fire Control Sections (FCS)	5	12	18	Not Shown	68	103
Missiles	155	183	391	Not Shown	2907	4273

UNCLASSIFIED

11-278 C1, 31 Mar 81

í

Project: #D212
Program Element: #6.43.07.A
DOD Hission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: \$4 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimate Cost
Military Construction, Army(MCA) Funds (current requirements) Funds (as shown in FY 1981	0	0	42200 <u>3</u> /	66004	214048 3/	322252 3/
submission)	3800	0	42000	Not Shown	σ	0

1/ 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.
2/ Reductions in production quantities directed by OSD in SECDEF Decision Memo from DSARC III, 10 Sep 80.
3/ Increases in Military Construction, Army (MCA) are added requirements for deployment of Patriot to US Army Europe (USAREUR) and US Army Porces Command (FORSCOM). NATO Infrastructure Funds will also be used for construction of operating facilities in USAREUR.

UNCLASSIFIED

Project: #0212

Program Element: #6.43.07.A

DOD Mission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)

Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

E. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

- (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 phase 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-lik 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 in 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) Four individual fire units were built during Engineering Development. Fire unit 1 was constructed in a non-mobile configuration as the radar antenna and the launcher were installed in fixed positions at White Sands Missile Ringe (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 was still by wire between elements. Fire Unit 3 is Fire Unit 1 upgraded to a tactical prototype. Fire Unit 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 costs with these units. Besides their severe individual tests, Fire Units 3, 4, and 5 were included in tests of the battalical command and coordination capability. By exchanging data and receiving tactical directions from the battalion unit by talicical 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 (BD) test program was organized into contractor and government taking 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: the first phase was the initial proof-of-principle and EDT firings, the second was between Feb 76-Nov 77, and the third con tinued until February 1980. The contractor fired 50 missiles during these phases. The government test program was original-

UNCLASSIFIED

L1~280

Project: #D212

Program Element: #6.43.07.A

DOD Mission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)

ttle: Patriot (SAM-D)
Title: Patriot (SAM-D)
- Arfulty: #4 - Tactical Programs

ly configured to fire 70 missiles. Thirty firings were reduced by the elimination of DT/OT III, and ritteen were reduced in 1978 because data from other missions would suffice, leaving 25 for DT/OT. The reduction was offset partially by adding signulation capabilities to provide a more comprehensive system evaluation. These 25 firings were reduced subsequently to 18 when a lammer could not be developed to stress the system. A total of 68 missiles were fired in ED by he contractor and government and eleven more are planned in an electronic countermeasures growth program. A summary of ill firings to date is at subparagraph (below.

The ED program progressed to build prototype equipment to be used in tests and firing .. Ten Control Test Vehicles (CTV) were fired to prove missile aerodynamics and control. The ED program was reoriented in January 1974 to demonstrate the Track-Via-Missile (TVM) guidance concept through the Proof-of-Principle firing program. Phase 1 system 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 Plight 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 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

Five additional engineering evaluation firings were peradditional 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 using fire unit 1 against various electronic countermeasures. An extensive search/track test program was conducted to exercise the system against various electronic countermeasures (ECM) and target scenarios. These tests included

weather and natural clutter environments were used.

In addition, the data from these tests was 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 Project: #0212 Program Element: #6.41.97.A #913 - Ground Air Defense

DOD Mission Area:

Title: Patriot (SAM-D) Title: Patriot (SAM-D) Budget Activity: 14 - Tactical Programs

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 in by 050 was made to accelerate the program by moving the full-production decision from March 1983 to April 1980. This decision eliminated DT/OT III 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 the system in the field led to this decision. The funds saved were applied to developing an improved simulation capability.

- (3) (0) Phase I'll contractor tests were completed in February 1980. They consisted of 28 missile flights in electronle countermeasures (109) environments in addition to system environmental and multiple fire unit search/teack tests. The Government has monitored and participated in the PQT by the contractor (PQT-C) during Phases I-III to satisfy as many go PQT-G requirements as practicable to preclude duplicative testing. Military personnel were incorporated into the program to assess critical man-machine interfaces. Development Test and Operational Test evaluators also shared test data for use during their independent evaluations.
- (U) The OT/DT events utilized prototype PU's 3, 4, and 5 for the conduct of both tests. FU 3 wis used only for specific tests during Of. 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 electroalcally 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 it semit the data between FU's and the battalion system) is an Army Standard item but does not meet Patriot emplicement time requirements. A new design to meet the PATRIOT requirements will be manufactured by the prime contractor. The electronic equivalents of the CRS and AMS were available for testing in DT/OT II. The Electric Power Plant (EPP) using standard generators did not meet the reliability requirements and a new development was implemented. The CRS, AMS, and EPP will undergo development testing and production confirmatory tests (PCT) in 1980-82. One of the new development Electric Power Plants was available for OT/DT and one for environmental testing. A waiver was granted by the Repartment of the Army for evaluation on the complete Maintenance Support Package (MSP) and to defer complete evaluation of the CRS, AMS, and Blectrical Power Plant (EPP) until the Post DSARC III evaluations. The MTSP tested in OT II provided data on how well the Patriot system performed against its RAM requirements. A maintenance enhancement program (MEP) is being developed to significantly (75% to 99%) improve the capability of organizational maintenance personnel to isolate and repair maifunctions. The Department of the Army will conduct a Maintainability Component Design Confirmation (MCDC) test as part of the post-DSARC III testing in 1981 to evaluate MEP.

Project: #D212

Program Element: #6.43.07.A

DOD Mission Area: #213 - Ground Air Defense

Title: Patriot (SAM-D)

Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

- Reliability and maintainability data has 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. The Patriot firing units have demonstrated less than satisfactory growth toward specified Hean Time Between Failure (MTBF) values during the government Prototype Qualification Tests and Operational Tests. The launcher reliability growth has been less than anticipated due to a lack of operational hours to demonstrate its reliability, but production reliability is expected to meet requirements. Missile reliability for the test program to date has been satisfactory with the Patriot missile achieving a point reliability estimate of There have been 32 firings since the change to the modular digital airborne guidance system (MDAGS).
- (U) Environmental qualification tests were conducted as a coordinated government-contractor test program to determine the effects of natural and induced environments. Climatic testing has been conducted at Eglin AFB, FL, and end item testing has been done at the contractor plant facilities and WSMR. Mobility and transportability tests on the launcher and missile have been conducted at Aberdeen Proving Ground, MD. Compromising emanations testing has been conducted at WSMR.
- g. (U) The development contractor for the Patriot system is Raytheon Company, Bedford, MA, with Martin Martetta of Orlando, PL, as the primary subcontracter for the missile. BG Jerry M. Bunyard is the Patriot Project Manager. The development testing is being designed by AMSAA and conducted by the US Army Test and Evaluation Command (TECOM), and the operational test is being conducted by the US Army Operational Test and Evaluation Agency (OTEA).

PATRIOT Flight Test Results to Date.

FIL No.	Date	Engagement Objective	FU.	Mission 1/	Reliability Scoring
1	27 Feb 75		DM *		
2	31 Mar 75		DM		
3	19 Jun 75		DM		
4	18 Jul 75		DM		
5	15 Aug 75		DM		
6	16 Sep 75		DM	Ĩ.	

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

Flt No.	Dat e	Engagement Objective	FU	Mission Results	Reliability Scoring
7	30 Sep 75		DN		
8	5 Nov 75		DM		
9	26 Nov 75		DM		
10	19 Dec 75		DM		
11	16 Jan 76		DM		
12	22 Jan 76		DM		
13	6 Feb 76		DM		
14	19 Feb 76		DM		
15	2 Dec 76		1		
16	28 Jan 77		1		
17	18 Feb 77		1		
Flt				Mission	Reliability
Flt No.	Date	Engagement Objective	FU	Mission Results	Reliability Scoring
	<u>Date</u> 30 Mar 77	Engagement Objective	<u>FU</u> 1		•
No.	30 Mar 77	Engagement Objective			•
No. 18		Engagement Objective	1		•
No. 18	30 Mar 77 21 Apr 77	Engagement Objective	1 1		•
No. 18 19 20	30 Mar 77 21 Apr 77 21 May 77	Engagement Objective	1 1 1		•
No. 18 19 20 21	30 Mar 77 21 Apr 77 21 May 77 21 May 77	Engagement Objective	1 1 1		•
No. 18 19 20 21 22	30 Mar 77 21 Apr 77 21 May 77 21 May 77 2 Jun 77	Engagement Objective	1 1 1 1 2		•
No. 18 19 20 21 22 23	30 Mar 77 21 Apr 77 21 May 77 21 May 77 2 Jun 77 4 Nov 77	Engagement Objective	1 1 1 1 2		•
No. 18 19 20 21 22 23 24	30 Mar 77 21 Apr 77 21 May 77 21 May 77 2 Jun 77 4 Nov 77 9 Feb 78	Engagement Objective	1 1 1 1		•

Title: <u>Patriot (SAM-D)</u>
Title: <u>Patriot (SAM-D)</u>
Budget Activity: <u>M</u> - <u>Tactical Programs</u>

500	mission acea	. VZIS GIDDING HIT DETERM	Ξ.			
Flt				Mission	Reliability	
No.	Date	Engagement Objective	FU	<u>Results</u>	Scoring	
			2	,		
28	17 May 78		2			
29	31 May 78		2			
30	31 May 78		2 2 2			
31	31 May 78		2			
32	22 Jun 78		٤			
33	31 Aug 78		2			
34	4 Oct 78		2 2			
35	4 Oct 78					
36	4 Oct 78		2			
37	28 Sep 78		2 2			
38	12 Oct 78					
39	17 Nov 78		2			
40	19 Jan 79		2			
41	24 Feb 79		2			
42	6 Mar 79		3			
43	27 Apr 79	•	3			
44	2 May 79		3			
45	17 May 79		3			
DT-G2	22 Aug 79		2 3 ·			
46	28 Aug 79					
47	8 Nov 79		3			
48	14 Nov 79		2			
49	l Dec 79		3			
50	16 Jan 80		3			
G22/23	8 Feb 80		4	•		
G20/21	29 Feb 80		5			

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

Flt No.	<u>Date</u>	Engagement Objective	<u>FU</u>	Mission Results	Reliability Scoring
G24/25	18 Mar 80		5		
G14/18/ 19	25 Mar 80		5		
G8	19 Apr 80		5		
G13	5 May 80		5		
Gl	23 May 80		5		
G6	5 Jun 80		5		
Gl 3a	13 Jun 90		5		
G-6a	16 Jul 80		5		
G-26	18 Jul 80		5		
G-27	21 Jul 80		5		

^{*} DM-Advanced Development demonstration model.

**First attempts to launch the above missiles resulted in launch aborts. These were not scored for flight test results. However, both were scored launch reliability failures. Results shown above for these missiles are for second launch attempts.

***Missions combined to demonstrate a capability to achieve terminal guidance

 $\frac{1}{2}$ Mission results based on criteria of project manager for contractor firings, AMSAA for DT firings, and OTEA for OT firings.

 $\frac{2}{\epsilon}$ Reliability scoring based on test community scoring criteria.

2. (U) Operation 1 Test and Evaluation:

II-286

...

. .

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: #4 - Tactical Programs

- a. (U) The US Army Operational Test and Evaluation Agency (OTEA) is conducting Operational Test II (OT II) from November 1979 to March 1980 and will conduct a Follow-on Evaluation (FOE) prior to deployment. Nine of twenty-five 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 Bilss, TX, on prototype equipment manned by soldiers from an active duty bittalion. These soldiers were selected by the US Army Training and Doctrine Command (TRADOC), were trained by the project management office for these tests, and underwent collective training by TRADOC.
- b. (U) The Patriot OT II was a ten-month, two-phase test with a Patriot Battalion mines (consisting of two firing units, a command and coordination set (CCS), 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 19 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 to include simulated chemical environments. 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 exercises. Subtest 4 was a series of four live fire exercises with one or two fire units launching nine missiles in four separate firings during multiple simultaneous engagements (three firings of two missiles and one firing of three missiles). All firing missions were completed by the end of March 1980. All testing during OT II was conducted in an ECM environment using Standoff Jammers (SOI) and/or Self-Screening Jammers (SSI). Chaff was included during selected tests. The Patriot CCS was interfaced with an Alt Defence 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 to be 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 (GPE) incorporated into Patriot was also 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.

Project: #D212

Program Element: #6.43.07.A
DOD Mission Area: #213 - Ground Air Defense

Title: <u>-Patriot (SAM-D)</u>
Title: <u>Patriot (SAM-D)</u>
Budget Activity: #4 - Tactical Programs

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 following evaluation and will have minimal impact on collecting operational data for a full production decision. 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.

3. System Characteristics: The essential system requirements at the confidential level are provided below.

Operational/Technical Characteristics

Objectives

Range (km) - Max Min

Altitude (km) - Max

Target - Max Velocity (m/s) Target Manever (g) in formation

Availability - Inherent Missile MTBF (hrs)

Reaction Time (Auto) (Sec)

PSSK

Reload Time (Minutes)

Title: Patriot (SAM-D)
Title: Patriot (SAM-D)
Budget Activity: 14 - Tactical Programs

4. (U) PATRIOT Verification Program:

a. (U) An extended R&D phase will be conducted in which preproduction prototype configuration fire Units will be 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 will be those development-type evaluations/events to be conducted by the contractor and Project Manager. Units 3 and 4 are to be formal tests of the PATRIOT system under 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 will be structed along the lines of the tests and reviews of DDTE Memo, subject: Test and Evaluation Assessment of PATRIOT (II) , dated 15 Aug 80.

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	Jun 81-Dec 82	FU's 3, 4	Production Prototype
Component Design		•	
Configuration (CDC)	Feb-Mar 82	CS I	Production
System Design			
Configuration (SDC)	Apr-May 82	CS 1, 2	Production
Unit 4	Nov 82-Apr 83	CS 1, 2, 3	Production
Environmental Qual-	•		
ification Test (EQT)	Aug 82-Oct 83	CS 4	Production

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D213

Program Élement: #6.43.97.A

DOD Mission Area: #213 - Ground Air Defense

Title: PATRIOT Electronic Counter-Countermeasure (ECCM) Enhancement
Title: PATRIOT (SAM-D)
Budget Activity: 44 - Tactical Programs

DETAILED BACKGROUND AND DESCRIPTION: The PATRIOT system is being developed to replace NIKE HERCULES and HAMK in the Field Army. PATRIOT's engineering development has been keyed to an Electronic Countermeasure (ECM) threat postulated of the threat.

Improvements from this program will and software enhancements will be made to achieve the improved performance. Hardware improvements are:

Both hardware

Software improvements include:

- B. (U) RELATED ACTIVITIES: None
- C. (U) WORK PERFORMED BY: The Raytheon Company at 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 Laboratory, Adelphi, MD, and the project will be managed by the PATRIOT Project Management Office, Muntsville, AL-
- D. (II) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
 - 1. (U) FY 1980 and Prior Accomplishments: Not Applicable
- 2. (C) FY 1981 Program: Conceptual design, initial definition of performance trade-offs, and initial design efforts will begin on those items having a significant improvement in performance against the advanced threat. The emphasis will be to provide specific hardware and software requirements so that detailed design and evaluation can be started. Initial eval-

Project: #D213

Program Element: #6.43.07.A

DOD Mission Area: 1213 - Ground Air Defense

Title: PATRIOT Electronic Counter-Countermeasure (ECCM) Enhancement
Title: PATRIOT (SAM-D)
Budget Activity: #4 - Tactical Programs

untions will be made to demonstrate concepts, integrate software and hardware designs, and refine requirements.

Modifications to system-level performance simulations will be made to provide the tools required to evidente design changes. Emphists will be placed on

- 3. FY 1982 Planned Program: Continue design and testing of modifications to hardware and software identified in requirements analysis. Simulations and breadboard tests will be performed on Engineering Development equipment at White Sands Missile Range (WSMR). Search/track tests will be made to evaluate performance and demonstrate successful integration of software and hardware changes. Documentation of proposed hardware and software design changes will begin. Development of Fuze and warhead improvements will begin.
- 4. FY 1983 Planned Program: Tests to be performed will include Engineering Ground to Air tests, Search/Trick tests and missile firings. Simulations using results of live testing will continue to validate software and hardware performance against numerous threat scenarios. Modification of production line procedures to accommodate design changes will be initiated in a production engineering task. Complete development of tasks initiated in FY81 and FY82 and continue further Continue tasks to improve development of the system performance in
- 5. Program to Completion: ECCM enhancements will be integrated into systems-level tests and evaluations. Production release occurs and improvements are incorporated into production
 - 6. (U) Major Milestones: Not Applicable to this project.
 - 7. (U) Resources (\$ in thousands):

Project: #0213
Program Element: #6.43.07.A
DOD Mission Area: #213 - Ground Air Defense

Title: PATRIOT Electronic Counter-Countermeasure (ECCM) Enhancement Title: PATRIOT (SAM-D) Budget Activity: 14 - Tactical Programs

	FY 1980 Actual_	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current fequirements)	0	19573	28058 1/	To Be Dete	rmined	
Funds (as shown in FY 1981						
submission)	0	19606	24780	Not Shown	27177	71563
Quantitles (current requirements)						Not Applicable
Quantitles (as shown in FY 1981						Not Applicable

Other Appropriations: Improvements are to be folded into currently programed production contracts when system design finalized and tested.

1/ (U) increases result from a more detailed analysis of tasks to be performed and evaluation of design changes necessary to counter the evolving threat.

UNCLASSIFIED

11 292 - C1, 41 Mar 81

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.09.A

DOD Mission Area: #213 - Ground Air Defense

Title: ROLAND
Budget Activity: #4 - Tactical Program

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Costs
	TOTAL FOR PROGRAM ELEMENT Quantity - Fire Units Quantity - Missiles	11299	12613	4000	12439	11377	326790 4 90
D647	ROLAND	11299	12613	4000	12439	11377	3267 #3

8. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for design transfer of the French/German ROLAND II All-Meather Short-Range Air Defense (SHORAD) missile system to the US; modifications to meet required system performance; and development of the ROLAND institutional Trainer (classroom trainer) and Maintenance Institutional Trainer (maintenance simulator). A US ROLAND fall-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 urgent need for an all-weather SHORAD missile system capable of defending critical targets against the growing Soviet all-weather, low-altitude, high-performance aircraft threat. The Army does not now have such an all-weather system.

BASIS FOR FY 1982 RDTE REQUEST:

Milestone Dates Shown in FY 1981 Submission Current Major Milestones Milestone Dates Defense Systems Acquisition

Review

Council I/II

FEB 74

FEB 74

11-293 Cl, 31 Mar 81

Program Element: #6.43.09.A

DOD Mission Are: #213 - Ground Air Defense Title: ROLAND Budget Activity: #4 - Tactical Program Source Selection Evaluation JAN 75 JAN 75 Joint US/European Test NOV 78 NOV 78 (Completed)
Defense Systems Acquisition MAY 79 Review Council III MAY 79 Low Rate Production OCT 79 OCT 79 Defense Systems TBD Acquisition Review Council IIIb Initial Operational Capability(IOC) (Tactical Unit)

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

Diver	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDFE Funds (current requirements) Funds (as shown in FY 1981	11299	12613	4000	23816	326790
subalssion	11299	.12638	0	0	299049

An increase of \$.120 million in FY81 was the result of revised Department of Defense inflation guidance; \$4.0 million to FY82 funding initiates US share of the trinational Joint ROLAND Improvement Program to counter the advanced post-FY85 threat; \$23.8 million in outyear funding continues Joint ROLAND Improvement Program design/development efforts.

II-294 C1, 31 Mar 81

Program Element: 16.43.09.A
DOD Mission Area: 1213 - Ground Air Defense

Title: ROLAND Budget Activity: #4 - Tactical Program

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

Missile Procurement, Army:	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Funds (current requirements)	299702	428900	529300	То ве	Determined	
Funds (as shown in FY 1981 submission)	296900	412000	551000	124000	0	1607200
Quantities - Fire Units: (curremt requirements)	18	171/	31	60	51	180
(as shown in FY 1981 submission)	18	23	51	o	Э	95
Quantities - Missiles: (current requirements)	410	4001/	795	1200	3306	6186
(as shown in FY 1981 submission)	410	600	1230	0	824	3139

Notes:

1/ Award of the FY 1979 and FY 1980 production contracts was delayed more than four months because procurement funds could not be released until the FY80 authorization issue for US ROLAND was resolved by the Congressional join, authorization conference. Award of the FY81 production contract was delayed more than two months due to uncertainties surrounding program continuation within early FY82 budget guidance. The impact of these delays and inflationary economic conditions was handled by reducing FY81 hardware quantities.

UNCLASSIFIED

11-295 Cl. 31 Mar 81

Program Element: #6.43.09.A DOD Mission Area: #213 - Ground Air Defense Title: ROLAND

1213 - Ground Air Defense Budget Activity: 14 - Tactical Program

- F. DETAILED BACKGROWIND AND DESCRIPTION: The objective of this program is to transfer technology and fabricate hardware for the conduct of engineering development tests on a US-built ROLAND air defense system. The US ROLAND system will provide an all-weather surface-to-air missile capability for use in defense of forwirl drives and other critical assets. The US ROLAND will replace the presently deployed European and CONUS nondivisional CHAPPARAL/VULCAN units. The US ROLAND system consists of a fire unit module (two missile launchers, internal missile storage compartment for 8 missiles, acquisition and tracking radars, electro-optical sight, and other fire control equipment) mounted on a single X9975 tracked vehicle. The US system can engage low-flying targets at ranges out to km and altitudes up to km. The US ROLAND missile may be launched in the tracking radar mode for an all-weather capability or in the optical mode without using the tracking radar. At Intercept, warhead detonation can be initiated by either a proximity or an impact fuze.
- G. (U) RELATED ACTIVITIES: Evaluations to verify the technical performance of three foreign-developed air defense systems (the German/French ROLAND II, the United Kingdom RAPIER, and the French CROTALE) were conducted under Project 0699 (Evaluations of Foreign Meapon Systems) of Program Element 6.33.01.A (Advanced Forward Air Defense Systems). Close Haison is maintained with the development/production efforts of the French/German ROLAND II program. The development program for the US ROLAND conforms to the provisions of specific Hiense agreements and Memorandums of Understanding which closely control the configuration, joint test management and international interchangeability. The Joint ROLAND Control Committee (JRCC) was organized to administer these provisions.
- H. (U) MORK PERFORMED BY: The program is managed by the US Army Missile Command (MICOM), Huntsville, AL. Hughes Alroraft Company (HAC), Canoga Park, CA, and Boeing Aerospace Company (BAC), Seattle, WA, are associate prime contractors for system production. HAC and BAC are collected to produce the system in the US by Euromissile, the European consortium responsible for the European ROLAND 11 system.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

I. FY 1980 and Prior Accomplishments: The Short-Range Air Defense (SHORAD) Requirements Study concluded that a requirement existed for an all-weather, low-altitude SHORAD missile system. This requirement was approved by the Army Staff in August 1973 and revalidated in April 1979 at the ROLAND Army Systems Acquisition Review Council (ASARC) III. The SHORAD Missile Program was approved by the Defense Systems Acquisition Review Council (DSARC) in February 1974. Four contractors responded to the Army's request for proposals: (1) Philoc-Ford for the all-weather CHAPARRAL missile system, (2) Rockwell International for the GROTALE missile system, (3) United Aircraft for the RAPIER system, and (4) Hughes Aircraft Company for the ROLAND II system. A Cooperative Test Program was initiated in 1975 with the German Government. This program was designed.

Program Element: #5.43.09.A DOD Hission Area: #213 - Ground Air Defense

Title: ROLAND Budget Activity: 44 - Tactical Program

ned to reduce the technical and schedule risk of the engineering development phase of the program. In August 1975 the Army's contractor (lingues Aircraft Company) projected a cost growth in the technology transfer, fabrication, and test contract. A special Army Systems Acquisition Review Council (ASARC), on 17 October 1975, directed that the program be restructured to gram. During FY 1976 the contractor's program was closely monitored by issuing funds in monthly incremental allocuents suffillent to permit completion of the design transfer. Fabrication of electrical and mechanical subcomponents of the missile mil fire units began. The Cooperative Test Program was completed in February 1976 at Patrick AFB, FL. A restructured contract proposed by Hughes Aircraft Company was negotiated in August 1976, and a special ASARC was held to September 1976. The ASARC recommended continuation of the program to a Special Defense Systems Acquisition Review Council (DSARC) which met 24 September 1976. During FY 1977 and 1978, fabrication of 4 fire units and 90 missiles to be used in terting was completed. Full system testing consisting of a coordinated operational and developmental test program commenced in November 1977 and was completed in April 1979. Design and fabrication of a US National Field Maintenance Test Set (FMTS) was initiated in FY 1977. Opporative efforts on the international interchangeability continued with more than 550 field replace ble subassemblies approved by the Joint (Germany, France, and US) ROLAND Control Committee. Initial Production Facilitization (IPF) tunds were released in mid-FY78 by the Department of Defense. Design effort was initiated in FY 1979 to incorporate

modifications into the track radar and to provide the FMTS with a support a spability for the Organizational Maintenance Test Set's (OMTS) Surveillance Ralar Tast Sat. \ 73333 III was held 31 May 1979 for the purpose of authorizing production of the US ROLAND. On 6 June 1979, approval was granted by the Secretary of telemae to proceed with the FY 1979 and FY 1980 low-rate production programs as presented to the DSARC. Award of the FY79 and F760 low-rate production contracts was delayed, however, until October 1979 and January 1980, respectively, as a result of in FY80 Congressional authorization issue which required joint authorization conference resolution. Activities incident to technology transfer close-out and design/test efforts to incorporate modifications and provide support capability were continued in fy80. authorization issue which required joins assume modifications close-out and design/test efforts to incorporate modification and the problem and initiated development/prototype fabrication of the ROLAND Institutional Trainer (classroom trainer).

FY 1981 Program: 1980 saw low-rate production continued after a two-month delay due to out-ortainties surrounding program continuation within early FY82 budget guidance. December saw award of production contracts rotaling over \$275 million, and completion of Reliability Evaluation Testing initiated in November. modifications design/test efforts will be completed as will the ROLAND Institutional Trainer development. Development of the Maintenance Institutional Trainer (differentiance Simulator) will begin as a productivity-enhancing capital investment initiative. DSARC life will be held to improvement prior to full-rate production approval. review system reliability and

> 11-297 Ct, 31 Mar 81

Program Element: #6.43.09.A DOD Mission Area: #213 - Ground Air Defense Title: ROLAND Budget Activity: #4 - Tactical Program

- 3. (U) FY 1982 Planned Program: Continue production to attain the Army's minimum essential all-weather SHORAD requirement of four US Roland battalions; begin confirmatory testing in December 1981. Initiate US share of the tri-national Joint Roland Improvement Program to counter the post-FY85 threat.
- 4. (U) FY 1983 Planned Program: Continue production and confirmatory testing. Continue design and development of Joint ROLAND Improvement Program modifications with Europeans to meet the post-1985 threat.
 - Program to Completion: Complete confirmatory testing in January 1984 and deploy first tactical unit in

11-298

PY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.09.4

DOD Mission Area: #213 - Ground Air Defense

Title: ROLAND
Budget Activity: #4 - Tactical Programs

J. (U) Test and Evaluation Data

l. (U) <u>Development Test and Evaluation</u>: The US ROLAND, an adaptation of a French-German-developed system, has completed the Technology Transfer, Fabrication, and Test (TTF6T) phase. This phase contained test programs equivalent to developmental/operational tests (DT/OT) and included joint tests with the Europeans, as well as nutional testing of the US-built system. The objectives of these tests were: (1) to determine if the European technology had been successfully transferred, (2) to evaluate system performance versus requirements, and (3) to collect sufficient data to validate system simulations. Completion dates of the various tests follow.

System Integration
Mobility Test
Arctic Test
Environmental Test
Performance Test (Missile Firings and
Tracking Missions)

- Completed January 1978
- Completed September 1978
- Completed March 1979
- Completed April 1979

- Completed April 1979

With the successful completion of the TTF&T program, a Defense Systems Acquisition Review Council (DSARC) III was held in May 1979, and approval was granted to enter into low-rate production. A requirement for three additional major tests was presented by the Army and endorsed by the DSARG. The first is a separate special avaluation test program which will be conducted during July 1990-June 1981 for the purpose of evaluating modifications to correct deficiencies found in TTF&T testing. These tests will be conducted by the developer. The second was a combined reliability evaluation test that was conducted during November-December 1980 to evaluate system reliability growth as a result of improved components. This test, which included a realistic and vigorous field test, was managed by the US Army Operational Test and Evaluation Agency (OTEA). The third major test to be conducted is the confirmatory test program which is scheduled to start December 1981 and run through January 1984. Production hardware will be used in confirmatory testing, which will include developer as well as extensive operational testing. The major objectives of these combined tests are as follows:

Developer Testing

- . Verify production hardware performance in clear and adverse weather conditions.
 - . Evaluate maintenance support equipment.

II-299

Program Element: #6.43.09.A DOD Mission Area: 4213 - Ground Air Defense Title: ROLAND Budget Activity: #4 - Tactical Programs

. Verify US missile safety.

Accept tactical missiles.

Operational Testing

. Syaluate production equipment performance in an operational environment unfor clear and adverse weather conditions.

· Assess ROLAND training program.

. Assess adequicy of the support concept.

. Assess tactics, doctrine, and safety that affect training, maintenance, and employment.

The US ROLAND Technology Transfer, Fabrication, and Test (TTF&T) program consisted of missile firings, tracking tests, environmental tests, and maintenance demonstrations. The missile firing program included a joint European/US test (E.IT) program as well as US national tests. The US fired 64 missiles in the national tests; 43 missiles were fired in the European joint test (E.IT) program for a total of 107 missile firings. Seventy firings were successful, and 31 (18 US and 18 EJT) were unsuccessful. However, on 11 of the 31 total flights considered unsuccessful, sufficient test data was gathered to meet the primary test objectives. Six firings (5 US and 1 EJT) were scored as no test. Major problems which resulted in failures were caused by either design deficiencies or inadequate acceptance procedures. The design deficiences were common to both the US and European design. However, by using a test-fix-test philosophy, the deficiencies were corrected, the fixes were retested, and successfully demonstrated prior to the completion of the test program. The tracking, environmental, and maintenance demonstration test results indicate that ROLAND met all major requirements with two exceptions, and system reliability. Modifications to improve follow.

. A modification has been designed in coordination with the Europeans which incorporates an

The con-

plete modification will be subjected to system testing from July 1980-February 1981 as part of the special evaluation test pro-

. The Europeans have taken the lead to incorporate a Similarly, the US has taken the lead on the track radar's' with these modifications will be available for testing during the special evaluation test timeframe.

Hardwire

. A joint US/European

will be tested during fiscal year 1981, November 1980 to have 1931.

11-299 A

Program Element: #6.43.09.A

DOD Mission Area: #213 - Ground Air Defeuse

Title: ROLAND
Budget Activity: #4 - Tactical Program:

(U) During the test program, seven items were identified that require improved reliability. These items are the environmental control unit, prime power unit, logic unit, track radar local oscillator and signal processor, and the surveillance radar transmitter and receiver. The reliability evaluation portion of the reliability improvement program, underway since March 1979, was completed 15 December 1980.

The hardware to be tested in the remaining major test phases will be of the following configurations. The special evaluation tests will use an updated Technology Transfer, Fabrication & Test (TTF&F) fire unit and missiles which incorporate the The configuratory tests will use hardware delivered from the production line. At this time, all required subsystems and support equipment are expected to be available for these test programs.

(U) The development contractor on US ROLAND was the Hughes Aircraft Company, with the Boeing Aircospace Company as the major subcontractor. Hughes and Boeing will provide test support juring the remaining tests. The development tester is the US Army Test and Evaluation Command and the operational test agency is the US Army Operational Test and Evaluation Agency (OTEA). The operational test portion of the confirmatory test program will be conducted by OTEA. The following are the major test facilities, ranges, and types of personnel that will conduct and/or participate in the testing.

Test	Pacility	Type of Personnel
Special Evaluation	White Sands Missile Range, NM	Government and contractor civilians
Confirmatory	Boeing Aerospace Company, Seattle, WA White Sands Missile Range, NM	US Army troops, Government and contractor civilians US Army troops, Government and contractor civilians
	Aberdeen Proving Ground, MD	US Army troops, Government and contractor civilians
	Redstone Arsenal, AL	US Army troops, Government and contractor civilians
	Port Clayton, Panama	US Army troops, Government and contractor civilians

(U) The test schedule and major milestones follow.

Program Element: #6.43.99.A DOD Mission Area: #213 - Ground Air Defense

Title: ROLAND Budget Activity: #4 - Tactical Programs

. Special Evaluation Test

Start July 1980 Complete June 1981

. Confirmatory Tests

.. Developer Testing

... Logistics Evaluation

Start December 1981 Complete September 1982

... Performance Testing

Start January 1982 Complete May 1982

... First Article/Initial Production Tests

Start June 1982 Complete June 1993

.. Operational Testing

Start September 1983 Complete January 1984

- (9) The number of units scheduled to undergo testing follows.
- . Special Evaluation Test One fire unit and five to nine missiles for firing. . Confirmatory Tests 12 fire units, 40 missiles for firing, 3 field maintenance test sets, 3 organizational maintenance test sets, and 3 operator proficiency trainers.

Below is a tabulation of missile firings of the US Technology Transfer, Fabrication, and Test (TfF&T) program.

Objective Establish System Biseline

Mineuvering Target Countermeasures

Successful

Unsuccessful

No Test

11-299 C

Program Element: #6.43.09.A

DOD Mission Area: #211 - Ground Air Defense

Title: ROLAND

Budget Activity: 14 - Tactical Programs

Objective

Successful

Unsuccessful

No Test

Formation Targets Environmental Helicopter Arctic

Total

(U) Hardware configurations for all Technology Transfer, Pabrication and Test (TTF6T) tests were identical. ROLAND has not been previously tested by another Department of Defense component. Retest requirements luring if FF6T established the need for the special evaluation test and the reliability test. The test environments for the previous and future tests are as follows.

Pre/lous

Puture

Special Evaluation Test

White Sands Missile Range. Same System ground tests, tracking and firing tests in an electronic countermeasures environment.

(U) The WSMR portion of the Special Evaluation Test has been underway since July 1989. This program consists primarily of ECM,IRCM, and chaff testing of modifications to be included in the production hardware. The IRCM and ECM ground tests have been completed, as well as the ECM tracking tests (including chaff). Seven missile firings have been completed to date and the remaining are scheduled to be completed in March 1981. The final evaluation report will be available June 1931.

Previous

Puture

Reliability Evaluation

Combination of factory and development tests conducted at White Sands Missile In Combination with confirmatory testing at White Sands Missile

11-299 D

Program Element: #6.43.09.A
DOD Mission Area: #21) - Ground Air Defense

Title: ROLAND
Budget Activity: #4 - Tactical Programs

Previous

Future

Range and an operational test Range, NM, Ft. Bilss, at Whitz Sands and Vandenberg TX, Aberdeen AFB, CA. Proving Ground, MO.

Reliability, availability, and maintainability (RAM) testing is a primary ingredient in testing. The major objective of the reliability demonstration (November-December 1937) was to determine system reliability improvement in terms of average mean time between failure (MTBP). A goal of hours fire unit average MTBP was set for this test. A Technology, Transfer, Pabrication and Test (TTFST) fire unit was upgraded with production configuration hardware for those items which exhibited unacceptable failure rates in TTFST. The Reliability Evaluation Test at Fort Lewis, Washington, was completed on 15 December 1939. The test was conducted by the Air Defense board for OTEA using FORSCOM troops as operators and organizational maintenance personnel. The total test system test time was approximately 560 hours of operation against the tactical scenario. Test results confirmed that the established test goal was successfully demonstated, and that the reliability growth achieved indicates that the system MTBP goals can be met. The OTEA final report is scheduled for completion in late March 1931.

The confirmatory tests (December 1981-January 1984) will include a complete evaluation of reliability, availability, and maintainability (RAM) in both developer and operational testing. Additionally, an evaluation will be made of the logistics support concept to be used during deployment. The RAM requirements to be demonstrated during confirmatory testing are in follows.

- . Fire unit average MTBF hours (after 500 confirmatory test hours)
- . Year time to repair hours
- . Operational availability -
- . In flight missile reliability -

All hardware used in confirmatory testing will be projection units. US Army troops will conduct the tests and maintain the system hardware. Production hardware planned for future testing and deployment is functionally identical to that used during development testing except for the inclusion of modifications for and reliability as previously discussed. All subsystem qualification and environmental tests have been completed, with the exception of tropic testing. The system successfully completed the roadability/transportability testing at Abeclean Proving Ground, MD, which involved approximately 1500 miles of road travel, arctic testing at the Cold Regions Test Center in Alaska, and electromagnetic radiation

11-299 E

Program Element: #6.43.09.A DOD Mission Area: #213 - Ground Air Defense Budget Activity: 34 - Tactical Programs

effects testing at White Sands Missile Range. Fixes to all qualification problems identified during these tests will be incorporated into the low-rate production hardware and requalified in the confirmatory tests. During confirmatory testing, the production units will be subjected to the same type of vigorous tests to assure no degradation from the development hardware. Tropic testing, which is a part of confirmatory testing, is scheduled to be held at the Tropic Test Center, Fort Clayton, Canal Zone, from April through October 1982. This testing will be in three physes. In the first phase, the US ROLAND fire unit, support equipment, and tactical missiles will be stored in a tropic environment, after which the system will undergo a functional checkout. In the second phase, the fire unit and support equipment will be subjected to a 1990-kilometer durability and mobility test over secondary roads and cross-country terrain. The final phase will consist of target tracking tests to evaluate system performance and gunner capabilities in a tropic environment.

2. (U) Operational Test and Evaluation: The US ROLAND has completed the Operational Test II (OT II) portion of the Technology Transfer, Pabrication, and Test (TTPAT) phase of life cycle testing. OT II was completed in two phases--firing and nonfiring. The firing phase was conducted at White Sands Missile Range, New Mexico, using military crews performing the mission and contractor personnel performing maintenance. The nonfiring phase was conducted at Vandenberg Air Force Base, California, to take advantage of the frequent occurrence of fog and low-level cloud cover. The objectives of the test were to: (1) assess the capability of the system to engage and destroy threat targets in an operational environment including adverse weather and enemy countermeasures, (2) assess the survivability of the US ROLAND in a hostile environment, (3) assess system personnel requirements, (4) assess the effectiveness of doctrine and tactics as they affect the employment of the system, (5) assess the reliability and obtain information on the availability and maintainability characteristics of the system, (6) obtain information on the integrated logistics support concept, and (7) obtain information on the program. Significant milestones of the Operational Test II of the TTFST phise were:

. Firing Phase

Completed August 1978

. Nonfiring Phase

Completed November 1978

(U) An independent Follow-on Evaluation as part of the confirmatory test program will be conducted by the US Army Operational Test and Evaluation Agency (OTEA) during September 1933-January 1984 to (1) evaluate production equipment performance in operational environment, (2) verify correction of operational deficiencies from prior testing, (3) evaluate missile durability under field handling conditions, (4) evaluate reliability, availability, and maintainability (RAM) of fire unit and peculiar support equipment, (5) assess Army ROLAND training program, (6) assess adequacy of the integrated logistics support concept, and (7) assess tactics, doctrine, safety, and human finters engineering that affect training maintenance and employment.

UNCLASSIFIED

11-299 F

Program Element: #6.43.09.A DOD Mission Are:: #213 - Ground Air Defense Title: ROLAND

Budget Activity: #4 - Tactical Programs

(U) As previously stated, Operational Test II (TT II) was conducted by the US Army Operational Test and Evaluation Agency (TEA) in two parts. The first part was the firing phase conducted at White Sands Missile Range using military crews and a military test conductor. During this phase a US ROLAND platoon (two fire units) fired both warhead (US and European) and telemetry missiles at high performance drones considered to be hostile afteraft to demonstrate operational ffectiveness. All firings were fouble target presentations, i.e., eight presentations of two targets. For four of the presentations, one fire unit was to engage both targets and during the other four presentations, two targets were engaged by two fire units. The target affect profiles that were as tactically realistic as possible within the limits of the range. The second part of the OT II, the nonfiring phase, was conducted at Vandenberg Air Force Base. During this phase a series of field exercises were held, and tactical jet aircraft and helicopters were flown to assess the mission performance of the US ROLAND. Particular emphasia was placed on the crew's ability to overcome limitations imposed by adverse weather and electronic countermeasures. The tactical scenarios and mission profiles used during the test were developed by the US Army Training and Doctrine Command (TRADOC). Events were replicated during the tactical exercises as required in an operational environment to obtain essential data for analysis. During the test, the system, supported by the necessary command and control and maintenance support elements, conducted a sories of tactical operations. As a result of OT II, OTEA came to the following overall conclusions concerning the operational effectiveness of the US ROLAND system.

- (U) . US ROLAND has demonstrated the capability to perform the all-weather, low-altitude air defense mission.
- (U). Demonstrated reliability of US ROLAND is insufficient to support completion of a 72-hour consecutive operational mission period with only organizational maintenance.
 - (U) . Maintainability has not been ested
- (U). System effectiveness, with emphasis on performance under threat level electronics countermeasures (ECM), system reliability, and system maintenance concepts should be further examined in the battery-level Follow-on Evaluation (FOE) now planned.
- (U) The reliability evaluation testing (previously discussed in paragraph J.L.), conducted November-December 1930, provided over 500 hours of testing and confirmed improved reliability. At the outset of the US ROLAND program, a testing philosophy was adopted which provided for the production decision to be supported by sufficient testing to demonstrate US ROLAND performance, assure successful technology transfer, and validate system operational performance. The evaluation of the maintenance concept was consciously deferred. The maintenance concept and system effectiveness will be further examined by OTEA in the Follow-on Evaluation (FOE) scheduled for September 1983-January 1934 during confirmatory testing as pointed out

UNCLASSIFIED

TÍ 299 G

Program Element: #6.43.09.A DOD Mission Area: #213 - Ground Air Defense Title: ROLAND
Budget Activity: #4 - Tactical Programs

previously. As stated before, the test-fix-test philosophy corrected other deficiencies, retested the fixes, and successfully demonstrated correction prior to completion of the test program. Identification friend or foe (IFF) was not adequately tested due to hardware availability. During the FOE, IFF testing will be emphasized.

(U) The FOE portion of the confirmatory tests will use hardware delivered from the production line. At this time, all required subsystems and support equipment are expected to be available for the test program. Currently, there are no contractor firings and 16 service firings planned for the FOE. These firings, to include those in adverse weather if possible, will be conducted tactically (within the constraints of range safety) to evaluate production equipment performance in an operational environment. The reliability evaluation test has been completed, and confirms that full-production reliability goals can be met.

3. System Characteristics:

Operational/Technical Characteristics

Objectives

Demonstrated/ Performance

* Porward Intercept Range Maximum (KM) Minimum (M) * Intercept Altitude Maximum (KM) Minimum (M)

- ° System Reaction Time (Sec)
- " Reload Time (Sec)
- " System Operational Availability (Ao)

11-299 H

Program Element: #6.43.09.A DOD Mission Area: #211 - Ground Air Defense

Operational/Technical Characteristics

° System Operational Effectiveness (Eso) Benign (nonelectronic countermeasures (ECM)), nonmaneuveringm single target Benign (non-ECM), maneuvering single target Benign (non-ECM), multiple target formit ion ECM environment, nonmaneuvering, single ECM environment, multiple target formation

- ° Antiradiation missile (ARM) Survivability
- ° Missile Reliability
- " Inherent Availability (Ai)
- " Target Speed Maximum (MPS)
 Minimum (MPS)
- * Engagement Tirget Manuevers (g's)

FOOTNOTES:

1 3/

1/ (U) Demonstrated during developmental/operational testing (DT/OT II).
2/ (U) To be retested during confirmatory testing.
3/ (U) Limited by White Sands Missile Range requirements and not by system capability.
3/ Demonstrated in European Joint testing with European system; the maximum demonstrated by the US ROLAND system was

11-299 [

Title: ROLAND

Budget Activity: 14 - Tactical Programs

Objectives |

Demonstrated/ Performance/

Program Element: #6.43.09.4 DOD Mission Area: #213 - Ground Air Defense

Title: ROLAND Budget Activity: 44 - Tactical Programs

5/ (U) In cases where demonstrated reliability, availability, and maintainability (RAM) performance has not use the Army's goal, improved system operational availability is expected as technical deficiencies are corrected, system improvements demonstrated, and additional testing is completed during the reliability demonstration test and

improvements demonstrated, and additional testing is complete inting the relability demonstration test and confirmatory testing.

(i) To be recalculated based on results obtained from the special evaluation test (July 1980-February 1981), the reliability demonstration test (October-December 1933), and confirmatory testing (December 1981-April 1983).

(i) Based on computer simulation and analysis, not on a demonstration test.

(ii) Based on tracking tests; the firing maximum target specifies.

which was constrained by the speed of the drone available and not system capability.

9/ Demonstrated in European Joint testing with European system; the maximum demonstrated by the US ROLAND system was

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.41.10.A DOD Mission Area: #/11 - Close Combat Title: Hellborne Missile - HELLFIRE
Budget Activity: 14 - Tactical Programs

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

Project Number	Title TOTAL FOR FROGRAM ELEMENT QUANTITIES	FY 1980 Actual 58000	PY 1981 Estimate 45002	FY 1982 Estimate 24791	FY 1983 Estimate 19671	Additional to Completion 0	Total Estimated Cost 320313 229
D074	Hellborne Missile - HELLFIRE	58000	45002	24791	19671	0	320313

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

1. (U) Engineering Development of the HELLFIRE Modular Missile System will continue through FY 1983. The Defense Systems Acquisition Review Council (DSARC) III production decision review will be conducted early in FY 1982 and the production contract will be awarded. Hardware that has been exposed to environmental storage will undergo laboratory testing.

F1-300

Program Element: #6.43.10.A

DOD Mission Area: #211 - Close Combat

Title: Mcliborne Missile - MKLLFIKE
Budget Activity: 14 - Tactical Programs

Mork to be done by the system prime contractor will include correction of deficiencies revealed by the AH 64 operational tests. Test program sets for the USM 410 test equipment will be completed for launcher test support. Development of the warhead marker charge will continue into FY 1982. Engineering design and fabrication of the minimum smake motor will be completed in FY 1982, and flight testing of the prototype models will begin.

2. (U) The UIL-60 Feasibility Demonstration, project number D069, which was included in the FY 1931 submission under this Program Element (P.E.), has been removed from this program element and is now included in P.E. 6.4.06.A, BLACK HAWK, in order to facilitate program management. Funding under project number D069 in the FY 1981 submission was \$3 million in FY 1980 and \$5.42 million in FY 1981.

3. (U) Development costs included in this Congressional Descriptive Summary have been validated by the Office of the Comptroller of the Army.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in PY 1981 Submission
Army Systems Acquisition Review Council/Defense Systems Acquisition Review Council (ASARC/ DSARC (11)	Feb 76	Feb 76
Engineering Development (BD) Contract Award	Oct 76	Oct 76
Operational Test (OT) II Start	Apr 80	Apr 80
Initial Production Contract Award	Nov 81	Nov 31
Missile & Launcher Availability	Jul 93	Jul 83
Intial Operational Capability (IOC) on Advanced Attack Helicopter (AAH)	Oct 84	Jan 85

UNCLASSIFIED

Program Element: #6.43.10.A

DOD Mission Area: #211 - Close Combat

Title: Heliborne Missile - HELLFIRE
Budget Activity: 14 - Tactical Programs

The IOC date for the AAH has been changed to January 1985.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	58000	45002	24791	19671	320309
Funds (as shown in PY 1981 submission)	61000	54844	21289	0	309978

The decrease in FY 1980 is due to the transfer of Project Number D069, UR-60 Feasibility Demonstration, from this Program Element (P.E.) to P.E. 6.42.06.A, BLACK HAWK, to facilitate program management. The decrease, in FY 1981 is also due to the transfer of Project Number D069 (\$-5420), Congressional reduction (\$-4897) which deleted additional RDTE funding requested when production start was delayed, and added inflation (\$+475). The FY 1982 increase reflects added inflation (\$+2498); additional effort for shelf life surveillance, countermeasures/counter-countermeasures and enhancement programs for the warhead, seeker, and propulsion section (\$+13848); and deferment of the Production Validation Test (PVT), Design-To-Unit Production Cost (DTUPC) award fee and risk capital funding to FY 1983 due to production schedule alip (\$-12844). The increase in cost to complete reflects a continuation of the efforts initiated in FY 1982 (\$+5753) and the deferred efforts from FY 1982 and associated inflation (\$+13918).

UNCLASSIFIED

Title: Heliborne Missile - HELLFIRE

Budget Activity: 14 - Tactical Programs

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

	PY 1980 Actual	PY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army						
Funds (current requirements)		20995	96540	120726	1094888	1333149
Funds (as shown in FY 1981 submission)		20800	126000	~	529986	676786
Quantities (current requirements)			502	1213	22885	24600
Quantities (as shown in FY 1981 submission)			2760	-	21840	24600

The FY 1981 increase reflects added inflation. The decrease in FY 1982 is due to a reduction in procurement funds in final preparations of the FY82-86 budget (\$-36000) and added inflation (\$+6540). The increase in the total estimated cost for this program element is due to the application of new inflation indices (\$49741), a revised production estimate (\$466492), and two-year schedule stretchout imposed by internal Army funding constraints in FY 1983 and FY 1984 (\$1401.0). The increases due to the revised production estimate are attributed to hardware cost increases in the missile bus (\$1:3364), seeker (\$139023), and launcher (\$11783); engineering services (\$21381), contractor system project management (\$115737), an additional requirement of 240 launchers (\$7083), increased test costs for first article and fly-to-buy test. (\$11633), inclusion of allowances for cost of money and government warranty parts (\$13614), and other refinements (\$22368). Decrease in the FY 1982 quantities is due to the reduction of procurement funds and a resulting less economical rate of production.

Title: Heliborne Missile - HELLFIRE
Budget Activity: #4 - Factical 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 Coasibility of helicopter-launched laser-guided missiles. During exploratory flight tests, fifty is missiles were fired from ground and aerial launch platforms using ground and airborne designation. Forty-one were successful. Competitive Advanced Development (AD) concracts 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 rogram with Martin Marletta Corporation to provide competition in the seeker development with the purpose of reducing production sinker 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 antigrous helicopy rs currently in the inventory. The lethality against , longer range, less time of flight, and versatility of HELLFIRE provide the Army a significant, improvement to defeat armor compared to TOW. The 7-inch-diameter missile will weigh 98.5 pounds, penetrate a minimum of of semi-infinite rolled homogenous steel and timeframe. This system will provide the Army with a common be capable of defeating potential enemy tanks of the timeframe. 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 infrared seeker and an air defense

G. (U) <u>RELATED ACTIVITIES</u>: The HELLFIRE missile system is related to Air Force, Navy, and other Army systems which utilize similar technology. Coordination to preclude duplication of effort is effected through technology coordination groups, frequent Haison visits, exchange of components and subsystems, and exchanges of analyses, simulation, and hardware test results. The exploratory prototype program was conducted under Program Element (P.E.) 6.23.03.A, Missile Technology, and the Advanced Bevelopment effort was conducted under P.E. 6.33.10.A, Heliborne Missile - HELLFIRE. Work on the infrared seeker,

11 304

Program Element: #6.43.10.A DOD Mission Area: #211 - Close Combat Title: Neliborne Missile - NELLFIRE
Budget Activity: #4 - Tactical Programs:

will be done under P.E. 5.43.16.A, Fire-and-Forget HELLFIRE, currently programed for funding in FY 1931. 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 Advanced Attack Helicopter is funded under P.E. 6.42.07.A. There is no duplication of effort between HELLFIRE and other Army or DOD systems within the same size, weight, range, and mission requirement classification.

H. (U) WORK PERFORMED BY: Contractors are Rockwell International Corporation, Columbus, OH, for wissing development, and Martin Marietta Corporation, Orlando, EL, for laser seeker development. The Army program manager (PM) is PM, HELLFIRE at Redstone Arsenal, AL.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) PY 1990 and Prior Accomplishments: Exploratory development work commenced in FY 1971. The PY 1972 program initiated concept formulation activities. This effort included work on fire control integration, laser acastroments, 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 PY 1973 program provided for completion of a cost-effectiveness study and two phases of Military Potential Tests (MPT). These efforts were designed to provide a basis for a decision to enter full-scale development of a loser-guided missile in FY 1974. The results from the MPT and Cost and Operational Effectiveness Analysis (COEA), however, revealed some operational uncertainties that warrined 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 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 (light tests. Because of FY 1976 funding constraints, the flight tests were not conducted. The contractors performed hardware-in-loop

UNCLASSIFIED

Program Element: #6.43.10.A

DOD Mission Area: #211 - Close Combat

Title: Meliborne Missile - HELLFIRE
Budget Activity: #4 - Tactical Programs

(ASARG/DSARG), 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 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 Ali-1 testhed 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. Environmental storage tests began. Thirty-one tactical prototype missiles, including five with live warheads, were flight tested in the HELLFIRE EDT and PQT flight test programs. Seventeen 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.

- 2. (U) FY 1981 Program: HELLFIRE engineering development testing and contractor system qualification tests will be completed during FY 1981 and efforts to correct technical problems will continue. Testing of warheads against advanced armor will be completed by the Ballistics Research Laboratory. The Technical Data Package (TDP) will be finalized to incorporate changes resulting from operational tests. Technical improvement efforts will include initiation of the minimum smoke motor development and changes in the laser seeker section which are expected to enhance productibility. The Production Engineering Planning (PEP) effort will be completed, and environmental storage tests will continue. The YAH-64 Helicopter OT II tests will be supported with hardware and technical support. Contracts for Initial Production Facilities (IPF) and procurement of long-lead items will be awarded to the system prime and seeker contractors. Preparations will be made for the Milestone III production decision reviews and for award of production contracts.
- 3. (U) FY 1982 Planned Program: Development and testing of the minimum smoke motor will continue in FY 1982. Test program sets for launcher test support will be completed. Environmental storage missiles will be laboratory tested. Deficiencies revealed in the YAH-64 operational tests will be corrected. Development of the warhead marker charge will be completed in FY 1982. The Defense Systems Acquisition Review Council (DSARC) III decision review will be held in the first quarter of FY 1982 with subsequent award of the first production contract.

UNCLASSIFIED

Title: Heliborne Missile - HELLFIRE
Budget Activity: #4 - Tactical Programs

4. (U) FY 1983 Planned Program: Testing of the minimum smoke motor will be completed in FY 1983 and missiles with the improved motor will be included in the third production buy; six missiles that have been subjected to environmental storage will be flight tested early in FY 1983. The first production hardware will be delivered, Production Vilidation Tests (PVT) will be conducted, and the Configuration Item Verification Review (CIVR) will be completed in FY 1983. HELLFIRE is scheduled to be operational on the AH-64 Helicopter in January 1985.

5. (U) Program to Completion: This program is scheduled for completion in FY 1983.

Title: Heliborne Missile - HELLFIRE
Budget Activity: #4 - Tactical Programs

- J. (U) TEST AND EVALUATION DATA:
 - 1. (U) Development Test and Evaluation:
 - a. (U) Summary of test phases and objectives.
- (THAD) Program was started in 1970. A modified HORNET missile (7") with a modified Palcon 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 based on 14 missile firings. Missile flight tests, using the testbed 7" missile, of the wide field-of-view laser seeker and the Army laser seeker were conducted at US Army Missile Command (MICOM) from November 1971 through January 1974. Combined results from these tests and the THAD tests (paragraph 1.a.(1) above) were used to support Development Tests (DT-1). Further technical tests were conducted at 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 FY75. Two tandem liner configurations, were tested. The Department of the Army requested that the HELLFIRE 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) Testing in EO consists of a series of Engineering Design Tests (EDT-C) and Prototype Qualification Tests (PQT-C) conducted by the contractor and EDT-G and PQT-G 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 through performance demonstrations with prototype models of the entire HHMS system. Additionally, testing will include participation of representative user personnel and "environmental proofing" through simulated and actual environmental testing. Reliability, availability, and maintainability (RAM) will be evaluated throughout development. Tests will allow the material developer to progressively evaluate and refine component, subsystem, and system design to assure that system performance requirements are being

Title: Heliborne Missile - HELLFIRE

Budget Activity: 14 - Tactical Programs

achieved. Development tests are planned to be conducted so that important system characteristics will be tested and deficiencies corrected prior to the Army Systems Acquisition Review Council (ASARC III). Six modified Ali-1G helicopters, four basic and two equipped with the Airborne Target Acquisition and Fire Control System (ATAFCS), are being utilized as "testbed" aircraft to qualify the HELLFIRE Modular Missile System (HMMS). HELLFIRE missiles are also being launched from the YAH-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 will include subsequent testing of components, subassemblies, and assemblies of each HELLFIRE end item. Results from these tests will substantiate performance of components when integrated with other components and subsystems of their end items and validate their selection as part of the HMMS. Samples of critical components will be independently tested and evaluated by the Government. Unguided missile (balilatic) flights were conducted early in the development program to provide data for missile airframe/propulsion and launcher design as it relates to missile launch parameters and helicopter safety. Preprogramed missile ilight tests were conducted to provide missile integration. Guided flight tests are being conducted to demonstrate performance of end items as the configuration progresses toward final design. Contractor Component Qualification Tests were initiated in December 1978 to determine if critical components meet their performance requirements while operating under or after being subjected to the environmental extremes necessary for system functions. System Qualification Tests will be conducted to demonstrate HMMS performance in the varied adverse environments.

(3) (U) In accordance with Department of the Army direction, the Army Missile Command (MICON) Laboratory is conducting a program to evaluate and characterize Advanced Attack Helicopter (AAH)/RELLFIRE performance in Lattlefield obscuration environments. The effort to gather field test data for 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 besignator, was completed during FY80. This data, time correlated to carefully measured obscuration environments, will be 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 will be validated by system tests including HELLFIRE flight tests in obscurants. In the latter part of FY81 the validated BELDWSS simulation will be used to characterize system performance across the entire spectrum of obscurant conditions, to provide data for the AAH/HELLFIRE ASARC/OSARC evaluations. There are no Defense Systems Acquisition keview

Title: -Heliborne Missile - HELLFIRE
Budget Activity: 14 - Tactical Programs

b. (U) Seventy-three guided missiles, 58 with telemetry, have been launched in the current developmental resting programs for both HELLFIRE and the AAH. Included in these launches were six live warhead missiles, all of which hit their targets. One of these was the first airborne launch of a live warhead HELLFIRE missile from a YAH-64. Test results, parameters, and malfunctions of developmental guided launches are tabulated below:

(U) Prototype Missiles
(Succes/Fired)

Low and high trajectories

(U) Results: (U) Program

	HELLFIRE	42/49
	YAH-64	19/24
	Total	60/73
(U)	Parameters:	
	Direct Fire	Indirect Fire
	Lock-on before launch (LOBL)	Maximum range of
	Lock-on after launch (LOAL)	Designation of GLLD

Maximum range of 15-degree offset

Moving target

Day Night

Program Blement: #6.43.10.A DOD Mission Area: #211 - Close Combat Title: Heliborne Missile - HELLFIRE
Budget Activity: #4 - Tactical Programs

Designation by GLLD and TADS

Rapid and ripple fire

- (U) Malfunctions:
- (1) (U) Gyro circuit board short circuit: resolved.
- (2) (U) Actuator potentiometer short circuit: resolved.
- (3) (U) Launcher release mechanism for missile separation malfunctioned resulting in a hang-fire; resolved.
- (4) (U) Defective integrated circuit; random failure. A high reliability component was not available for use in this test because of long-lead item requirements.
 - (5) (U) FLIR sighting system on COBRA malfunctioned: data indicated nominal missile percormance.
 - (6) (U) Short impact: incorrect offset angle: resolved.
- (7) (U) Short impact: smoke decoyed Seeker. A geeker modification which employs last pulse logic has resolved the problem. Successful tests with the modified seeker have validated the correction.
- (8) (U) Immediate excessive pitch-up rate: a lock-on-after-launch firing in which thrust misalignment was compounded by premature turn-on of the designator. A repeat of this launch was successful but investigation is continuing.
 - (9) (U) TADS FLIR broke track: TADS design deficiency. Correction has been implemented.
 - (10) (U) Roll gyro tumbled: low stability margin. Autopilot has been modified.
- (11) (U) Short impact: a combination of launch elevation and pitch reference errors. Corrections have been implemented on the YAH-64 to preclude similar errors.

UNCLASSIFIED

Program Element: #5.43.10.A DOD Mission Area: #211 - Close Combat Title: Heliborne Missile - HELLFIRE
Budget Activity: 44 - Tactical Programs

(12) (U) Short impact: seeker design deficiency that allows "direction of track reversal" when target acquisition occurs at unusually high energy levels at the edge of the field of view. Seeker design was clanged. Retest with modified seeker was successful.

(13) (U) Missile broke track before target impact: thrust alignment malfunction. Missile turn rate was faster than the seeker track rate. Investigation continuing.

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 YAH-64 and AH-1 (COBRA). A gas storage system (on the launcher) is provided for cooling infrared detectors in follow-on seekers. It is anticipated that there will be no significant differences between the prototype and the production configurations.

- d. (U) All subsystems and support equipment will be available during required test periods.
- e. (U) Developing/Testing Organizations.
 - (1) (U) Development Contractor: Rockwell International Corporation Hissile Systems Division 4300 East Fifth Avenue Columbus, Oil 43216
 - (2) (U) Service Program Manager: Project Manager, HELLFIRE/GLD
 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

UNCLASSIFIED

....

Program Element: #6.43.10.4 DOD Mission Area: #211 - Close Combat Title: Heliborne Missile - HELLFIRE Budget Activity: #4 - Tactical Programs

- f. (U) Major Test Facilities.
- (1) (U) US Army Missile Command, Redstone Arsenal, AL Contractor and government personnel are conducting the missile flight, captive flight, component qualification, system qualification, and electromagnetic radiation tests.
 - (2) (U) Eglin AFB, Florida Contractor and government personnel are conducting missile flight (ests.
- (3) (U) Yuma Proving Ground, Arizona Contractor and government personnel are conducting YAH-6%/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) (0) System Qualification Tests, Jan 80 Jan 81.
 - (4) (U) Environmental Storage Tests (PQT-G), Aug 80 Jul 92.
 - h. (U) Tabulation of developmental firings in HELLFIRE and Advanced Attack Helicopter programs.

UNCLASSIFIED

Program Element: #6.41.10.A

DOD Mission Area: #111 - Close Combat

Title: Hellborne Missile - HELLFIRE
Budget Activity: 14 - Tactical Programs

		Type Missile	No. Flights Planned/Completed/Successful			
(1)	Exploratory Development	Modified Hornet	56	56	41	
(2)	Terminal Hooting Accuracy Demonstration (THAD)	Modified Hornet	15	15	15	
(3)	HELLFIRE Engineering Develo	pment				
	Ballistic Rounds	-	3	3	3	
	Programe 1 Rounds	-	4	4	4	
	Guided Hissiles	ED	74	49	42	
	Advanced Attack Helicopter	Engineering Development			•	
	Ballistic Rounds	_	6	6	6	
	Guided Hissile	ED	50	24	18	

- 1. (U) The HELLFIRE Modular Missile System has not been previously tested by another DOD component.
- J. (U) HELLFIRE Modular Missile System reliability, availability, and maintainability durability (RAM-D) performance requirements are to be verified by test, demonstration, and analysis prior to full-scale production using valid data from the guided flight test only system qualification test programs. The test program for mission-critical components includes demonstration of high reliability under critical environments. RAM-D trade-offs will be performed within allowable limits for achievement of maximum system effectiveness at minimum cost.
- k. (U) The Items being tested during development are not significantly different from the hardware for operational tests and production.
- 1. (U) Tests will be conducted to determine if system end items 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.

UNCLASSIFIED

1[~3]4

Title: Heliborne Missile - HELLFIRE
Budget Activity: 14 - Tactical Programs

- 2. (U) Operational Test and Evaluation:
- a. (U) Summary of Test Phases and Objectives
- (1) (U) Laser-Guided Missile System (LAGUMS) Military Potential Tests were conducted in 1972 and 1973. These tests evaluated the ability of the helicopter gunner 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 hardward 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).
 - 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 recently completed 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 HBLLPIRE missile and not the total weapon system as it will be fielded. That weapon system will be evaluated during the ANI OT II in June-August 1981.
- (2) (U) Thirty-three HELLFIRE missiles were fired in the operational test completed 11 July 1980. A combination of direct, indirect, rapid and ripple firing modes were used in a battlefield environment which included dust and smoke. The Independent Evaluation Report has not been published to date; however, preliminary results of a scoring conference evaluation show 23 target hits out of 33 missiles fired. Results of the HELLFIRE operational test live firings:

Title: Heliborne Missile - HELLFIRE
Budget Activity: 14 - Tactical Programs

(V) System reliability
33 Missiles launched
3 Scored no-test
3 Scored missile failure 27 Scored reliable out of 30 Reliability = 90%

Accuracy given a reliable missite
27 Reliable attempts
3 Scored no-test

l Target miss Hits out of 24 reliable_attempts Probability of hit =

- (3) (U) Missiles were scored as "no test" due to limitations of the surrogate launch system, the AH-1 (COBRA), and crew error.
 - c. (U) Description of equipment being tested.
- (I) (U) The HELLFIRE missile system is a high-explosive antitank (HEAT) missile with a laser sceker, fire control system, launchers, and container. The HELLFIRE launcher carries four missiles. A gas storage system is provided for cooling IR detectors for follow-on seekers.
- (2) (U) The HELLFIRE missile and launcher being tested in the engineering development program have no significant differences from the planned production hardware configuration.
 - 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.

Title: Heliborne Missile - HELLFIRE
Budget Activity: #4 - Tactical Programs

g. (U) Overall test program schedule - Operational Testing (OT) was conducted May-July 1980. The preliminary results are discussed in subparagraph E.2.b. above.

h. (U) Additional service firings will be conducted during OT II in the Advanced Attack Helicopesis (AAH) program as part of the total weapon system evaluation. Twelve guided flights are planned.

1. (U) Operational tests (OT) to date have been those conducted to support OT 1. The Laser-Guided Missile System (LAGUMS) Military Potential Tests (MPT) evaluated the ability of the soldier or helicopter gunner to place and hold a laser beam on a target during target engagement and missile flight. The MPT were also used to examine the lactics, organization, and command and control for employment of LAGUMS-equipped helicopters. In subsequent tests, the operational performance of HELLFIRE was evaluated against extended range TOW (XRTOW) in a series of realistic, simulated battles.

j. (U) Operational tests have been conducted with the current NELLPIRE prototype missile which is to be the same as the production missile.

k. (0) A missile reliability point estimate of .88 has been demonstrated on Engineering Development firing attempts to date. The Materiel Need (MN) requirement band is .92-.95. The project estimate, based on missile improvements and OT results, meets this requirement. 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.

Title: Heliborne Missile - HELLPIRE
Budget Activity: 14 - Tactical Programs

System Characteristics:

Operational/Technical		
Characteristics	Ob jectives	Demonstrated Performance
Range		
Direct Fire	Kilometers	'Kilometers
Indirect Fire	Kilometers	Kilometers
Time of Flight		
3 Kilometers	Seconds	Seconds
Probability of Hit		
(Given Reliability)	·	
Stationary Targets	<u>.</u>	
Moving Targets	·	
Missile Weight, Max	99.5 pounds	98.5 pounds

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 16.43.11.A
DOD Mission Area: 1242 - Theater-Wide Theater Nuclear Warfare

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

A. (0) RESOURCES (PROJECT LISTING): (\$ in Thousands)

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	145765	147378	154107	106895	22771	669835# 34
D599	PERSHING 11	145765	147378	154107	106895	22711	669835*

^{*} Does not include \$18.0M received from AF PE 6.33.17.F (Theater Ballistic Missile Program) in FY 1979

B. BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: PERSHING II is an evolutionary modernization of the currently deployed PERSHING Ia system. PERSHING II will provide vastly improved performance over PERSHING Ia: increased range kilometers versus kilometers; higher accuracy meters versus meters); use of lower yield willeads, thereby reducing unwanted collateral damage/clvilian casualties; increased versatility through the use of the diburst/surface-burst warhead; superior military effectiveness and survivability; and manpower savings. The PERSHING II dev.lopment 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 batlistic component of the NATO Long-Range Theater Nuclear Force (LRTNF) modernization based on extensive negotiations with the NATO Alliance. The rapid fielding of extended range PERSHING II is a program of national urgency needed to fill the land-based ballistic missile

Program Element: #6.43.11.A DOD Mission Area: #242 - Theater-Wide Theater Nuclear Warfare Title: PERSHING II
Budget Activity: #4 - Tactical Programs

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 mon-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 LRTNF 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 1987 RDTE REQUEST: During FY 1982, the fabrication of the prototype Ground Support Equipment (GSE) will be completed, and fabrication of the prototype missile will continue. The first six (6) of the planned 28 DT/OT 11 missile firings will be conducted in FY 1982. During this period, qualification testing and preflight rating testing on the motors will be completed, and system environmental testing will be initiated. The Phase I Captive Test Program (i.e., captive testing of prototype hardware on a fixed-wing aircraft) will be completed during FY 1982. Long-lead procurement for the production phase will be conducted early in FY 1982, and following DSARC III, the full-production decision will be made.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Start Development Test I	Nov 77	Nov 77
Complete Development Test I	May 78	May 78
Defense Systems Acquisition Review Council II	Dec 78	Dec 78
Award Engineering Development Contracts	Feb 79	Feb 79
Start Development/Operational Test II	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 Test II	Aug 83	Aug 83
Initial Operational Capability	Dec 83	Aug 83
Production (Buy 3)	Oct 83	Oct 83
Production Deliveries Complete	Aug 86	Jul 86

Program Element: #6.43.11.A
DOD Mission Area: #242 - Theater-Wide Theater Nuclear Warfare

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

(U) In FY 1979 the decision was made to accelerate the 10C from December 1984 to August 1983. This acceleration was initially planned to be accomplished by compressing the Engineering Development program by four (4) months and pulling in the production decision by 12 months. To accomplish this ED compression, FY 1979 supplemental funding was required. Failure to receive these supplemental funds made it necessary to accomplish the 16-month acceleration by accelerating the production decision by 16 months. The entire acceleration is, therefore, accomplished by overlapping the development and production program. The initial production rate is being kept at a minimum (5 missiles per month) until DT/O1 II completion to reduce cost exposure. Following DT/OT II, the production rate will increase to a maximum of 13 missiles per month.

(8) As a result of continuing negotiations with our NATO allies, the US Covernment has agreed to make the European Initial Operational Capabilities (IOC) of PERSHING II and Ground-Launched Cruise Missile concurrent. Accordingly, on 26 November 1986 the Army was directed by the Office of the Secretary of Defense to delay the European IOC of PERSHING II from August 1983 to December 1985. The directive emphasized that the change to the IOC was for policy reasons and that the basic program would not change nor would funding profiles be changed.

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

RUTE	FY 1980	FY 1981	FY 1982	Additional To Completion	Est imated Cost
Funds (Current Requirements)	145765	147378	154107	129666	669835*
Funds (as shown in FY 1981	144800	145985	150032	130127	663844*
(noissimdus					

* Does not include \$18.0 million received from AF PE 6.33.17.F (Theater Ballistic Missile Program) in FY 1979. The change from the FY 1981 submission reflects the adjustment to incorporate a more realistic rate of inflation, increased test range costs (FY 1980), and the termination of the earth penetrator warhead program in Fy 1982 and beyond. The above total development cost is approximately \$8 million below the originally planned costs when they are escalated according to current DOD inflation indices. Consequently, the total development cost may be understated by that amount.

Program Element: #6.43.11.A DOD Mission Area: $\frac{16.43.11.A}{2.2}$ Theater-Wide Theater Nuclear Warfare

Title: PERSHING II
Budget Activity: 14 - Tactical Programs

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army: Funds (current requirements)	0	0	207700	349800		
Funds (as shown in FY 1981 submission)	0	0	179200	326800		

Quantities (current requirements) Constities (as shown in FY 1981 Solation)

Change from FY 1981 submission reflects a more realistic inflation projection, addition of funds for the procurement of shelters for housing the Platoon Control Central and the Reference Scene Generation Facility, and a transfer of funds from OMA to MIPA for conducting the PII SWAP program (cost associated with swapping the PII system for the Pla system). This submission also reflects an addition of FY 1982 funds for Department of Energy reimbursables. Not shown in this submission is an additional \$1.9 million in FY 1981 funds which will be reprogramed for Department of Energy reimbursables.

Program Element: #6.43.11.A DOD Mission Arca: #242 - Theater-Wide Theater Nuclear Warfare Title: PERSHING II
Budget Activity: #4 - Tactical Programs

DETAILED BACKGROUND AND DESCRIPTION: In order to meet the Supreme Allied Commander, Europe's GACEUR'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 (AD) of PERSHING 11. Five missile flight tests were conducted during the AD phase in FY 1978. These Hights 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 1978. As a result, the program was authorized to proceed into ED with extended range PERSHING 11 and two warheads airburst/surface burst and an earth penetrator. This directed extended range decision represents a substantial increase in the range over the currently fielded PERSHING Ia (PIa) version. A contract was awarded to the 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 11, 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 the recently vehicle that uses Radar Area Correlation Terminal Guidance to provide accuracy in the range of meters 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 ED 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 28 missiles during Development/Operational Test II. During FY 1978, significant factors were illuminated by the North Atlantic Treaty Organization (NATO) High Level Group discussions on Theater Nuclear Forces

Thus, they prefer an evolutionary approach, such as PERSHING. PERSHING is currently fielded by both US and West German forces, is politically acceptable to the NATO Alliance, and is not involved in current SALT negotiations. Thus, extended range PERSHING II offers an opportunity to introduce improved Theater Nuclear Force capability with minimum adverse political involvement. Based on the NATO High

Program Element: #6.43.11.A DOD Mission Area: #242 - Theater-Wide Theater Nuclear Warfare Title: PERSHING II Budget Activity: #4 - Tactical Programs

Level Group recommendation, SACEUR's stated need, existing policy and weapons available, PII has been identified as a system to insure consistency with the DOD Nuclear Policy and provide improved military effectiveness for the Long-Range Theatre Nuclear Force (LRTNF). The rapid fielding of extended range PERSHING II is of national urgency to fill the land based ballistic missile void in the NATO LRTNF. This is particularly critical in view of the expansion of the Soviet threat to NATO epitomized by the SS20 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 LRINF modernization by several years. PERSHING II will have a range capability from km thus providing in 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 (10C) 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 offorts 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) delected 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, plus its tactical mobility which provides sustained operations without constraining dependence on a main operating base, makes the system
- B. (U) WORK PERFORMED BY: US Army Missile Command, Redstone Arsenal, AL; White Sands Missile Range, NM; Martin Marietta, Orlando, FL; Goodyear Acrospace Corporation, Akron, OH; Singer Company (Kearfott Division), Little Falls, NJ; Bendix Corporation (Navigation and Control Division), leterboro, NJ; -Wercules, Inc., Salt Lake City, UT.

Program Element: #6.43.11.A

DOD Mission Area: 1242 - Theater-Wide Theater Nuclear Warfare

Title: PERSHING 11

Budget Activity: #4 - Tactical Programs

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: The PERSHING II program started in FY 1975. The primity 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 demonstratio, program. The US Army Armament Research and Development Command, Dover, NJ, was tasked with the responsibility for developing the earth penetrator the alrburst/surface-burst warhead section. The Department of Energy (DOE) was tasked with developing the earth penetrator warhead. The earth penetrator integrated design, less nuclear physics package, was completed and succensiully tested at high velocities into hard targets. The major prototype missile components were delivered; RV fabrication and ground/captive testing was completed for the Advanced Development (AD) missile flight hardware. The five-missile flight beaconstration program was conducted in FY 1978. The capability of the Radar area Correlation Cuidance Systems to attain the desired accuracy in a missile flight environment was proven during AD culminating with flight five, which recorded a pulses 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 met. Determas Systems Acquisition Review Council (DSCARC) II was held in December 1978 and gave approval for entering into cogineering development. The Engineering Development (ED) contract was awarded 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 flight tests were conducted to evaluate the correlator hardware. Prototype air vehicle and Ground Support Equipment (CSE)

2. (U) FY 1981 Planned Program: In FY 1981, prototype procurement activities will be completed and fabrication of the prototype ground support equipment will be initiated. Fabrication of the Reentry Vehicle and propulsion section will continue, and prototype testing will be initiated. The development testing of the propulsion section will be completed, and Preflight Rating Test will be initiated. The wind tunnel test program will be completed during this fiscal year, and fixed-wing captive tests to evaluate hardware and reference imagery will be initiated. Numerous system, subsystem, and environmental tests will be conducted during this period. During FY 1981, reference scene preparation will be completed for the ED missile flight targets. The earth penetrator warhead program will be terminated.

Program Element: 6.43.11.ADOD Mission Area: $624\overline{2}$ - Theater-Wide Theater Nuclear Warfare

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

3. (U) FY 1982 Planned Program: During FY 1982, fabrication of the prototype ground support equipment will be completed, and fabrication of the missile will continue. Static testing of the propulsion section will be completed, and the flight units will be delivered. The first six of the planned 28 Development Testing/Operational Testing (DT/OT) II missile flights will be conducted during this period. Long-lead procurement for the production phase will be conducted early in FY 1982 and following DSARC III, the full production decision will be made.

4. (U) FY 1983 Planned Program: The ED phase will culminate in FY 1983 with the completion of the 28 DY/OT II missile flights. The DT/OT II burdware will be made on production hard tooling, and this tooling will be used in production as the line will remain open and in continuous operation between the ED 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, providing US troop units in Europe and the Continental United States with a modernized system designed to meet the threat of the 1990's.

5. (U) Program to Completion: A third and fourth production buy will occur in FY 1984 and FY 1985 to provide PERSHING II hardware for deployment of all PERSHING II battalions and support the general missile firing programs. Production deliveries will be completed in 1986.

Program Element: #6.43.11.A DOD Mission Area: #242 - Theater-Wide Theater Nuclear Warfare Title: PERSHING II
Budget Activity: #4 - Tactical Programs

J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

a. (0) During the engineering development phase of the PERSHING II Development Program, extensive testing is being conducted. Wind tunnel testing is being conducted to verify the aerodynamic characteristics of the Lissile design. The first phase ended in July 1979. The second phase was started in October 1979 and will end early in FY81. No design difficulties have been identified as a result of this testing. In order to simulate the missile reentry environment (with the exception of velocity), the PERSHING II reentry vehicle pod was attached to the wing of a FJ4B aircraft and flown at targets. These captive flight tests were conducted to verify that the terminal guidance system can achieve the required accuracy and verify that the reference scenes are adequate for correlation. The captive flight tests were conducted at White Sands Missile Range, NM, the Watertown, NY, area, and the Huntsville, AL, area. Tests will be conducted in two phases. The early phase was completed in mid-FY 1980. The second phase will start in late 1981 on the prototype reentry vehicle and continue through late FY 1983. The prime objective of the second phase will be to evaluate the prototype haroware and verify the reference scenes that will be used in the missile flight program. Six static firings of the prototype first and second stage motors have been completed and have been judged successful. To date all testing has been successful and has provided infit(al verification of required performance. System environmental testing will be initiated in early FY 1982 and will continue through mid-FY 1983. These tests will include road shock and vibration, high-low temperature, temperature shock, snow, ice, humidity, wind, rain, dust, drop, salt, rail hump, ENP, etc. The purpose of these tests is to verify that the system remains operational throughout various specified environments. System marriage testing will start in early FY 1982. It will demonstrate the ability of the system to work properly as a system rather than as individual componen

b. During Advanced Development (1974-1978), system test and fixed-wing captive tests were conducted in preparation for 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 6D nautical miles, since the combination of inertial and radar correlation guidance techniques is independent of range. The overall flight test program at White Sands Missile Range was successful, and all objectives were demonstrated.

Program Element: #6.43.11.A

DOD Mission Area: #242 - Theater-Wide Theater Nuclear Warfare

Title: PERSHING II
Budget Activity: 14 - Tactical Programs

AD MISSILE FLIGHT NO.

	FLIGHT OBJECTIVE	1	2	3	4	5
c	Deliver RV to Acquisition Basket	*	*	1/	*	*
o	Demonstrate RV Maneuver Capability	*	*	-	*	×
0	Demonstrate Required PII System Accuracy		*		*	*
O	Demonstrate EP Structural Integrity					
	During Penetration	*	*		*	*
o	Verify EP Functional Performance	*	*		*	*

 $\frac{1}{2}$ In-flight failure - no test

Specific Goals in Advanced Development:

Inertial Measuring Unit (IMU)	Objectives CEP without terminal guidance	Status Analytically Demonstrated
Sensor Correlator Subsystem (SCS)	CEP	Demonstrated in Captive and Missile Flights
Reentry Vehicle (RV)	RV will withstand the flight environment	Demonstrated in Missile Flight Tests

- c. (U) Due to the limited production numbers of the PERSHING Weapon System, the engineering development prototype hardware will be made with the same tooling to be used in the production program. 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 testing 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.). All subsystems and support equipment will be available for scheduled tests during DT/OT II.
- d. (U) The prime contractor for PERSHING II, Martin Marietta Aerospace, Orlando, FL, 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 Arsenal, AL. The independent test evaluation agencies for PERSHING II will

Program Element: #6.43.11.A DOD Mission Area: #242 - Theater-Wide Theater Nuclear Warfare

Title: PERSHING II
Budget Activity: #4 - Tactical Programs

he 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.

e. (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 these tests are:

Test

Facility

Fixed Wing Captive Test

White Sands Missile Range (WSMR), MM

Huntsville, AL Watertown, NY Pope AFB, NC

Wind Tunnel Test

LTV, Dallas, TX AEDC, Tullahoma, TN Naval Systems Weapon Center

OTEA Ground Test

Fort Sill, OK

Missile Flight Test

Eastern Test Range, FL

Troops to perform the OTEA ground test and the DT/OT II flight tests will be from the PERSHING Battalion at Ft. Sill, OK. Contractor personnel will participate in the DT portion of these tests.

* The long-range firings will be conducted from the vicinity of Boise, Idaho, and impact within WSMR.

f. (U) The major tests with planned spans are shown below:

Wind Tunnel

Jan 79 - Jul 79 (Phase I)

Oct 79 - Feb 81 (Phase II)

Captive Test

Oct 79 - Apr 80 (early)

Jul 81 - Sep 82 (Phase I)

UNCLASSIFIED

Program Element: #6.43.11.A DOD Mission Area: #2.67 - Theater-Wide Theater Nuclear Warfare

Title: PERSHING 11
Budget Activity: #4 ~ Tactical Programs

System Marriage Test	Jan 82 - Jan 83
Structural Test	Oct 81 - Mar 82
Environmental Test	Jan 82 - May 83
DT II (14 missil flights)	Apr 82 - Feb 83
Operational Ground Test	Feb 83 - Apr 83
OT II (14 missile flights)	Apr 83 - Aug 83

- g. (U) 28 missile firings (14 DT, 14 OT) 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, five reference scene generation facilities, and four system component test stations are also planned for tests during the ED phase.
- h. (U) The currently planned missile firings for the DT Il flight program scheduled for April 1982 through February 1983 are as follows:

Flight No.	Range
1 & 2	Long
3 - 6	Short
7 - 10	Medium
11 ~ 14	Lone

- * Achievement of accuracy will, of course, be an objective of all flights. Specific objectives will be assigned to each flight as the test program is more fully defined. There has been no prior testing by other DOD components.
- i. (U) Reliability assessments will be conducted using the data obtained from all testing conducted during the ED program. This assessment will start with the early captive test results and continue throughout the 28 missile flights. Construction of the reliability growth curve for PERSHING II is currently in process with the goal of obtaining the required

UNCLASSIFIED

Program Element: #6.43.11.A
DOD Mission Area: #242 - Theater-Wide Theater Nuclear Warfare

Title: PERSHING 11
Budget Activity: #4 - Tactical Programs

reliability following the development missile firings. Maintainability is a parameter that is considered in any design decision on PERSHING 11. A maintainability demonstration and evaluation is planned for early FY 1933. This demonstration/evaluation will be conducted by the contractor and monitored by TECOM/AMSAA. The demonstration/evaluation will use prototype hardware from production tooling. Units for development test, operational test, and production requirements will be produced on the same "hard" production tooling and will be made of the same configuration. Extensive environmental tests will be conducted on the missile and ground support equipment. Tests will include road shock and vibration, high-low temperature, temperature shock, snow, ice, humidity, wind, rail hump, drop, EMP, etc. These tests will be conducted by the contractor at the contractor's facility.

2. (U) Operational Test and Evaluation:

a. (U) The US Army Operational Test and Evaluation Agency (OTEA) is the independent operational tester and evaluator for PERSHING II and has access for monitoring purposes to all testing conducted during engineering development. In addition, OTEA will conduct an independent operational missile firing program of fourteen missiles. OTEA will have full independence and control over these ground and flight tests.

b. (U) During Advanced Development, OTEA concluded that a separate Opertional Test (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.

c. (U) Hardware planned for OTEA Operational Test II flight tests will be of production configuration using "hard" production tooling. All subsystems and support equipment will be available for scheduled tests. OTEA ground and flight tests will use facilities at Ft. Sill, OK, and White Sands Missile Range. Troops from the PERSHING Battalion at Ft. Sill will be used in conducting these tests. The fourteen missiles to be fired during the OT II flight program included four that will be used during the ground test phase. Three erector launchers and associated firing battery hardware will also be available for use.

d. (U) The currently planned missile firings for the OT II flight program scheduled for April 1983 are as follows:

Flight No.	Range
15 - 24	Long
25 - 28	Short

Program Element: #6.43.11.A
DOD Mission Area: #242 - Theater-Wide Theater Nuclear Warfare

Budget Activity: #4 - Tactical Programs

- e. (U) Reliability and Maintainability assessments will be made by OTEA based on the DT II monitoring and OT ii ground and flight tests. However, the detailed tests, plans, and procedures have not been established.
- 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 16 months. This acceleration is accomplished by obtaining full-production approval after the first two DT missile firings. This decision date occurs prior to the planned OTEA ground or flight tests. OTEA participation prior to the production decision is limited to observing the development test phase of the engineering development program. OTEA testing will be conducted prior to system fielding. The first 19 missiles of the passile tests of the production of the producti total buy will have been produced prior to the completion of testing.
- g. (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.

System Characteristics:

Operational/Technical Characteristics	Objectives	Demonstrated Performance
Maintainability (mean time to repair)		To be determined
Range Requirements	100 - km	To be determined
Accuracy	CED	tone then

 $\frac{1}{2}$ Capability demonstrated in captive and missile flight tests during Advanced Development and captive tests during Engineering Development.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.13.A DOD Mission Area: #213 - Ground Air Defense Title: GRASS BLADE
Budget Activity: 44 - Tactical Programs

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

1	Project Number	TITLE TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 30215	FY 1981 Estimate 46713	FY 1982 Estimate 29919	FY 1983 Additional Estimate To Complete To be determined	Total Estimated on Costs
ĺ	D112	GRASS BLADE	30215	46713	29919	To be determined	

- 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 1982 RDTE REQUEST: Continue RDTE effort.
- D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in : ousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funda (current requirements) Funda (as shown in FY 1981	30215	46713	29919	To be determined	
submission)	30215	35784	13324	Not Shown	137645

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

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

UNCLASSIFIED

41-333 Ct, 31 Mar 81

... UNCLASSIFIED

Program Element: #6.43.13.A

DOD Mission Area: #213 - Ground Air Defense

Title: CRASS BLADE
Budget Activity: #4 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army: Funds (current requirements) Funds (as shown in FY 1981	0	29100	151000	To be dete	ermined	
submission)	0	11100	100200	292900	Not Shown	404200

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

UNCLASSIFIED

11~334 +1, 31 Mar 81

Program Element: #6.43.13.A

DOD Mission Area: #213 - Ground Air Defense

Title: GRASS BLADE
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: Program content is SEGRET "Limited Distribution Special Access Required," precluding further description in this summary. Access to GRASS BLADE information is controlled by the Deputy Chief or 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: Both in-house and under contracts.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS: Details may be provided upon request in accordance with paragraph B and F above.

UNCLASSIFIED

4...

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLRS) Formerly Known As

General Support Rocket System (GSRS)

Budget Activity: 14 - Tactical Programs

DOD Mission Area: #212 - Fire Support

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

Project Number	<u>Title</u>	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
D564	Multi Launch Rocket System	69209	68054	38291 <u>1</u> /	17330	0	318373 <u>2</u> /
	Quantities:						
	ROCKET/SPLI_3/	257/10	0/0	9/0	0/0	0/0	594/10

^{8. (}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 other warheads. Activities leading to a joint United States/United Kingdom/Germany/France Concept for a TGW Program definition were initiated in FY 1980 under the terms of the MLRS Memorandum of Understanding, signed in July 1979.

C. (U) BASIS FOR FY 1981 RDTE REQUEST:

1. (U) Continuation of Maturation R&D which is being conducted concurrently with low-rate production. Completion of production qualification tests, live firing tests, force development test and evaluation and operational test (OT) [[].

[1=336 C1, 31 Mar 81

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLRS) Jarmerly Known As General Support Rocket System (GSRS) Budget Activity: #4 - Tactical Programs

DOD Hission Area: #212 - Fire Support

2. (0) A comparison of current milestones with those shown in the FY 1981 summary is shown below.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
na jot vittescones	HI TESCONE DALES	Shown In Ft 1701 Showles 100
Start Operational Test (OT)	Dec 79	Dec 79
Complete Development Tests/OT	Feb 80	Feb 80
Army System Acquisition Review		
Council (ASARC) III	Apr 80	Mar 804/
Defense Systems Acquisition Revie	u .	· · · · · · · · · · · · · · · · · · ·
Council (DSARC) III	May 80	Apr 804/
Maturation/Production Contract	•	• =
Award	Apr 80	May 805/
Complete Production Qualification	•	
Test	Sep 82	Sep 82,
ASARC IIIa	Sep 82	0ct 82 <u>6</u> /
DSARC IIIa	Nov 82	Nov 82
Initial Operational Capability		
(TOC)	Nov 82	Nov 82

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

		FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Costs
	ROTE 7/					
ı	Funds (current requirements) Funds (as shown in FY 1981	69209	68054	38291	17330	31837 >
•	submission)	69225	64191	39652	11874	310431

UNCLASSIFIED

II-337 CI, 31 Mar 81

1947

Program Element: #6.43.14.A

DOD Mission Area: 1212 - Fire Support

Title: Multiple Launch Rocket System (MLRS) Formerly Known As

General Support Rocket System (GSR:)

Budget Activity: 44 - Tactical Programs

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Missile Procurement, Army						
funds (current regulrements)	61900	113700	179300	410900	3091800	3857600
Initial Spares ≅'	1700	2800	25500	8900	6700	45600
Funds (as shown in FY 1981					0,00	43000
submission)	61900	114200	150200	N/A	3169100	3495400
Initial Spares	400	2800	3600	N/A	6000	12800
Quantities (current requirements)						
Rocket/Launcher 9/	1374/12	2340/32	2496/68	25968/72	330654/92	3(3030/034
Quantitles (as shown in FY 1981		2,10,52	2470700	23300/12	330034/92	362832/276
submission) Rocket/Launchers 10/ (Launchers not shown in FY 1981)	1764/32	2340/48	2496/93	N/A	356622/0	362832/173
Other Procurement, Army						
(Resupply Vehicles and Trailer	a)					
Funds (current requirements)	•,					
Trucks		. 13900	12100	1.000		
Trailers		1200	1300	16900	55800	98700
Funds (as shown in FY 1981		1200	1 300	1700	6100	10300
submission were not broken out		16500	23000			
by Item)		10300	23000	N/A	82200	121760
Quantities (current requirements)						
Trucks and Frailers	0	72	- 66	0.4		
Quantities (as shown in FY 1981	•	12	00	84	258	480
submission)	0	72	100	11/4		
•	,	12	100	N/A	347	\$19

UNCLASSIFIED

11-338 C1, 31 Mar 81

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLRS) Formerly Known As

General Support Rocket System (GSRS)
Budget Activity: 44 - Tactical Programs

NOTES:

- 1. This number (\$18291) corresponds to the amount budgeted for FY82. The actual requirement for FY82, however, is \$61667. The difference (\$23376) will be made up by allied contributions.
 - 2. US share only. Addition of allied share (\$23376) Increases total to \$341749.
 - 3. Self-propelled launcher loader.

DOD Hission Area: #212 - Fire Support

- 4. Milestone delayed one month to permit more time to analyze test results.
- 5. Contract awarded one month earlier than planned.
- 6. Changed to correspond to Defense Systems Acquisition Review Council (DSARC) III goals established in May 1980.
- 7. Changes shown in FY81 are to fund the Force Development Test & Experimentation (FDTE) program not previously programed. The original request for FY82 in the FY82 budget was \$36.0M. There was an increase to \$38.3M to fund completion of the FDTE & OT III. \$5 million in "Additional to Completion" was deferred from FY 1982 to FY 1983 to reduce the possibility of forward financing. Remainder is inflation adjustment.
- 8. Actual field trials conducted during Operational Test (OT I) invalidated the engineering estimates for initial spares. Increase in requirement also due to expanded force structure.
- 9. Total program quantities were revised to support the adjusted force structure and employment concupt. The FY 1981 descriptive summary was written based upon a force structure of 24 batteries each with 6 launchers. This structure required procurement of 173 launchers. The revised force structure of fourteen separate batteries, each with 9 faunchers, and four battalions, each with 27 launchers, has increased the requirement to 276 launchers.
- 10. Procurement quantities in FY80 were lower than planned (1374 vs 1764 for rockets and 12 vs 32 cor launchers). These decreases were essential in order to remain within monetary appropriation constraints. Decreases resulted because the initial engineering estimates for the launcher proved to be too low and because of cost growth of the Soli-Propelled Launcher Loader.

in the

UNCLASSIFIED

11-339 (1. 3) Mar 81

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLRS) Formuly Known As

General Support Rocket System (GSRS)

Budget Activity: #4 - Tactical Programs

DOD Mission Area: #212 - Fire Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: This MLRS is the result of a continuing effort begun in FY 19/1. 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 MLRS for counterbattery fires and suppression of enemy air defense. In order to expedite a decision on the proposal to develop an attillery rocket system, the Assistant Secretary of the Army (RSD) requested that the Army conduct a design and evaluation study of future study of future artillery capabilities. This study, Tank 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 discrupt the enemy's command, control, and maneuver. One of the weapons which was 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 MLRS. In December 1975, a Special Study Group was organized to conduct an in-depth investigation of the MLRS Concepts, study possible alternative systems and to 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. Terminal Guldance Warhead (TGM). Development of the Terminal Guldance Warhead for the MLRS continues under Program Element 6.33.03.A, Project D216. The Defense Advanced Research Projects Agency "Assault Breaker" demonstrations will provide a technology baseline for both the MLRS TGW and the Army's Corps Support Weapon System antiarmor warhead. The TGW effort is managed by the MLRS Project Manager, and under the provisions of the quadrilaterally approved memorandum of understanding, the program is planned as a joint development (US/UK/GE/FR) through concept definition.
- 2. Heavy Expanded Mobility Tactical Truck (HEMMT). Procurement of 480 trucks with trailers 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.
- 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, California, for development of the self-propelled carrier vehicle. The war-

UNCLASSIFIED

11 340

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLRS) Formerly Known As
General Support Rocket System (GSRS)
Budget Activity: #4 - Tactical Programs

DOD Mission Area: #212 - Fire Support

head fuze is developed by the US Army Electronics Research and Development Command at its Harry Diamond Laboratories, Adelphi, Maryland. The dual-purpose improved conventional munition is provided by the US Army Armaments Research and Development Command, Dover, New Jersey.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: The Defense Systems Acquisition Review Council (DSARC) 1 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 dollars 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 Memorandum of Understanding (NOU) with France, Germany, and the United Kingdom for joint development of the MLRS system. This agreement calls for the US to underwrite the R&D costs for the basic program. The US funds will be supplemented by \$15 million contributions each from France and the United Kingdom during the FY80-82 period. The United Kingdom and France have made this initial payment of \$5 million. 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 pattners executed an agreement to negotiate the cost to support concept definition studies.

2. (U) FY 1981 Planned Program.

(U)Conduct 63 Maturation Plight Tests

(U)Complete Component Qualification Tests

(U)Complete Major Engineering Design Activity

(U) Fabricate FY82 Test Hardware

Program Element: #6.13.14.A

Title: Multiple Launch Rocket System (MLRS) Formerly Known As

General Support Rocket System (GSRS)

Budget Activity: 4 - Tactical Programs

DOD Mission Area: 1212 - Fire Support

3. (U) FY 1982 Planned Program.

(U)Conduct 42 Maturation Developed Flight Tests.

(U)Complete System Qualification Tests

(U)Complete Production Qualification Tests (PQT includes 114 rocket Flight Tests).
(U)Conduct Force Development Test & Evaluation (FDTE) and Operational Test (OT) III (FDTE and OT III include 198 Flight Tests).

4. (U) FY 1983 Planned Program.

(U)Achieve IOC in the first quarter by fielding one firing battery at Fort Riley, KS. An additional training battery will also be fielded at Fort Sill, OK.

Field one firing battery

5. (II) Program to Completion. RDTE program will be completed in FY 1983.

Program Element: #6.43.14.A

DOD Mission Area: #212 - Fire Support

Title. Multiple Launch Rocket System (HLRS) Formerly Known As

General Support Rocket System (GSRS)

Budget Activity: #4 - Tactical Program.

- J. (U) TEST AND EVALUATION DATA:
 - 1. (8) Development Test and Evaluation:
 - a. (U) Test Phases:
- (1) (U) Validation Phase. Because the validation phase results also served as the basis of source selection, competitive testing between Boeing and Vought was more extensive than that normally required during a more triditional Demonstration and Validation Phase. Testing was intended to demonstrate that all technical risks of the identified, that solutions were achievable 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) (D) 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 achievable solutions. Contractor Engineering Design From (EDT C) examined the feasibility of the MLRS hardware design. Components, subsystems and systems were tested to investing the hallity 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-C) and laded 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. This approach necessitated that government officials acquire an intimate knowledge of the hardware. Data from EDT-C were made available to respective contractors 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 emission, effluents, and wastes; and required system demonstration flights. ADVT data were used by the independent government evaluates to officially score system performance and reliability.

UNCLASSIFIED

100

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLRS) Formerly Known As
General Support Rocket System (GSRS)

DOD Mission Area: #212 - Fire Support

General Support Rocket System (GSRS)
Budget Activity: #4 - Tactical Programs

1 (U) Advanced Development Verification Tests-Contractor (ADVT-C):

These tests verified that the design approach was capable of evolving into a ruggedized weapon system that could achieve 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 with launch pod containers were exercised while exposed to high and low temperature extremes, high humidity, rain, sand, and dust, and icing conditions. The testing assured that the system was potentially capable of passing further Government testing such as Government Advanced Development Verification Test I.

- 2 (U) Advanced Development Verification Tests-Government (ADVT-G). The government tested subsystems and systems that were considered writical 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, medium, and maximum runges. Launcher mobility and endurance tests were conducted for the purpose of collecting reliability, availability, and miniminability data for the independent government evaluators.
- (2) (II) Maturation Phase. The Secretary of Defense directed that special emphasis be placed on testing of built in test equipment to include additional testing and demonstration of hardware maintenance features. These tests are to be concluded by FY 1982. Testing will be conducted on all components/subsystems which were not fully tested or qualified during the Validation Phase. Included are the tenton truck with trailer, software, and hardware for the Position Determining System, Platoon Leader's Digital Message Device, and integration with ancillary systems such as the fire direction system and automatic test equipment. Testing will also assure the adequacy of the system design as it is matured. Development testing will be a joint contractor/government effort as opposed to independent contractor and government resting. 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 for crews as test conditions warrant. Testing will consist of two phases: Maturation Development Tests and Production Qualification Tests.

UNCLASSIFIED

11 145

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLKS) Formerly Known As

DOD Mission Area: #212 - Fire Support

General Support Rocket System (GSRS)
Activity: 4 - Tactical Programs Budget Activity:

(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 Yought in its low-rate production facility. The following tests will be included:

(U) Component/subsystem/system performance. (U) Human Factors. (U) Maintsinability demonstration. (U) Rocket flight tests (including environmental). (U) Safety. (U) Transportability. (U) Countermeasures. ιō (U) Component/subsystem qualification. 11 (U) Electromagnetic radiation. (U) Computer software.
(U) Reliability. (U) Nuclear hardness.

(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, Mobility and Endurance Tests, and Command, Control and Communications Tests.

- Environmental Qualification Tests. These tests are being designed to demonstrate performance and reliability of the design in simulated and actual operational environments. Test hardware will be produced by Vought in its low-rate production facility. The Self-Propelled Launcher 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 launcher 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 temper-
- 2 (U) Rocket Performance Tests. Rocket flight tests will demonstrate rocket and Launch Pod Container reliability and accuracy versus range. End Items used in these tests will be the low-rate production hardware. Thight 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 Battery Computer Unit, a Platoon Leader's Digital Message Device, and three Self-Propelled Launchers to demonstrate that the MLRS battery is a totally integrated system and capable of performing its intended purpose. MLRS hardware will originate from the Van ht production line.

UNCLASSIFIED

11 345

Program Element: 16.43.14.A

Title: Multiple Launch Rocket System (MLRS) Formerly Known As
General Support Rocket System (GSRS)
Budget Activity: #4 - Tactical Programs

DOD Mission Area: #212 - Fire Support

The Battery Computer Unit will be produced by Norden Corp.

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)	VSMR	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	successful
Early Maturation Flight Tests (contractor	WSHR ()	Nov 80 Jan 81	6	Successful. Test objectives focused upon attaining correct warhead bust patterns.

UNCLASSIFIED

Program Element: #6.43.14.A

DOD Mission Area: 1212 - Fire Support

Title: Multiple Launch Rocket System (MLRS) Formerly Known As

General Support Rocket System (dSRS)

Budget Activity: 44 - Tactical Progress

TEST	LOCATION	SCHEDULE	NUMBER	STATUS
Maturation Development Flight Tests	WSMR	Mar 81 ~ Jan 82	100	
Production Qual Tests	WSMR	Feb - Sep 82	114	
Operational Test III	Canada	Jun - Aug 82	144	
Developer/Opnl Tests Flight	WSMR	Sep 82	54	

(2) (U) Self-Propelled Launcher Loader (SPLL) Testa.

TEST	LOCATION	SCHEDULE	STATUS
Govt. Eng. Dev. Tests (Mobility & Endurance)	Aberdeen Proving Ground, (APC), MD	Jul 79 - Sep 79	Test complete No major problems were encountered
Contractor Advanced Dev Verification Tests (Environmental)	Eglin APB, FL	Jul - Nov 79	Climate testing and human factors tests were completed with no major problems.

UNCLASSIFIED

11-347

Caralle

Program Element: #6.43.14.A

DOD Mission Area: #212 - Fire Support

Title: Multiple Launch Rocket System (MLRS) Formerly Known As
General Support Rocket System (GSRS)
Budget Activity: #4 - Tactical Programs

TEST	LOCATION	SCHEDULE	STATUS
Tests for determining human, environmental, electromagnetic, nuclear training, & flight Factors	WSMR, NM; Eglin APB, FL, Redstone Arsenal, AL	Feb 81 ~ Jan 82	
Command, Control and Communication tests to verify hardware and software compatibility.	Fort Sill	Jan 82- May 82	
Production Qualification Tests	WSMR, Eglin AFB APG, Redstone	Feb 82 - Sep 82	
Operational Test III	Canada	Jun - Sep 82	

- (3) (U) Summary: 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-accord 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 HLRS system was ready to enter a maturation and low-rate production phase. 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:
- (a) (0) Launch Pod Container and Self-Propelled Launcher Loader Performance: The Launch Pod Container, rocket, and Self-Propelled Launcher Loader tests confirmed that the system was made for operational testing. Single and ripple firings with a crew in the cub have been successfully demonstrated. The Self-Propelled Launcher Loader has performed well as a

UNCLASSIFIED

Program Element: #6.43.14.A

DOD Mission Area: #212 - Fire Support

Title: Multiple Launch Rocket System (MaKS) Formerly Known As

General Support Rocket System (GSRS)

Budget Activity: 44 - Tactical Progr (MAS)

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 during Maturation Testing. The launcher performed well in the simulated arctic, desert, and tropic environments with only minor problems noted at low temperature. No problems were encountered during the loading tests of the launcher and launch pod containers into the Ci41 aircraft. Indications are 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.

- (b) (U) <u>Firing Cycle Results</u>: Both contractors accumulated 9792 km and 3996 firing cycles on six launchers. Yought 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 testing.
- (c) (U) <u>Rocket Performance</u>: The Vought rocket reliability includes results of 62 scored string 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 sadar. All fuzes and warheads functioned.
 - 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-propelied 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.

40.4 1 1

- (a) (U) The carrier is a tracked vehicle derived from the XM2 Infantry Fighting Vehice.
- (b) (U) The automated fire direction system for the MLRS is the Battery Computer Unit which will communicate with the MLRS Fire Control System via encoder radio link. The MLRS fire control system contains a microprocessor that is capable of computing fire mission data.

HNCLASSIFIED

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLRS) Formerly Known As General Support Rocket System (GSRS) Budget Activity: 44 - Tactical Programs

DOD Mission Area: #212 - Fire Support

- (c) (l) 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 approximately 600 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, US Army Operational Test and Evaluation Agency, and the Project Office.
- e. (U) For all submystems 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: Units tested during Production Qualification Testing and OT III will be 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 (OT/OT). The OT portion of the test lasted for six weeks, and the equipment was tested by active duty soldiers. Two firing sections, each manning an MLRS candidate system, conducted a series of firing and nonfiring operational exercises in a testical 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 Pt Sill, consisted of two weeks of nonfiring field exercises in a simulated tactical environment. Phase III was a one-week combined Occardopment Test/Operational Test live fire exercise conducted at White Sands 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,

UNCLASSIFIED

E1~350

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (M.85) Formerly Known As

General Support Rocket System (GSRS)

Budget Activity: 44 - Tactical Programs

DOD Mission Area: #212 - Fire Support

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 and low-rate Production Phase. Additional operational testing viii be conducted during the design Maturation Phase. This testing will assess performance of production hardware including components and equipment that were not available during the Validation Phase (Battery Computer Unit, on-board Position Determining System, Platoon Leader's Digital Message Device, 10-ton resupply vehicle) and to resolve any remaining operational test issues.

- (1) (U) OTI Test results were evaluated by the Army Materiel Systems Analysis Agency, the Operational Test and Evaluation Agency (OTEA), and the Project Manager, COL Monte Hatchett. OTEA conducted the operational testing.
- (2) (U) Test facilities used during operational testing included Ft Sill, OK and White Sands Missile Range. Two Launcher Sections, a Fire Direction Center section, Maintenance Section, Ammo Section, and Direct/General Support Maintenance section participated in the operational testing.
 - (1) (U) Operational Test I was used to establish the RAM system requirements approved at DSARC [[1.
 - (4) (0) 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 has elected to conduct its own system evaluation during the period Pebruary-May 1982. This testing will assess the suitability of the system to enter into Operational Test III. Test objectives are essentially the same as those stated for OT III.
- (1) (U) Testing will be conducted to address the interoperability of command, control, and communications in a realistic electronic warfare environment with respect to:
 - (a) (U) MLRS Fire Direction Unit.
 - (b) (U) Launcher Fire Control System.
 - (c) (U) Platoon Leader's Digital Message Device
 - (d) (U) TACFIRE the Army's Tactical Fire Direction_System

11-351

and it

_. _ _ ~

Program Element: #6.43.14.A

Title: Multiple Launch Rocket System (MLRS) Formerly Known As

General Support Rocket System (GSRS)

Budget Activity: 44 - Tactical Programs

DOD Mission Area: #212 - Fire Support

(e) (U FIREFINDER (AN/TPQ-36 and/or AN/TPQ-37: The Army's Counterfire radars)

(2) (U) Testing will also be conducted to address reliability, availability, maintainability, 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.

Demonstrated

(II) System Characteristics: Operational/Technical

Characteristics	Objectives	Performance
System Accuracy Maximum Range		
Reaction time		
- Prepare to Fire		
- Displace		
- Total Mission		
(U) Reliability, Availability,		
Maintainability		
Reliability		
- rocket	.9597	.93
- SPLL	.8892	.84
Availability		
- MLRS Operational Availability	.6075	<u>1</u> /
- Essential unscheduled		
maintenance actions per		
1000 hours of Launcher		11
loader module operation	50	<u>1</u> /
- Performance of Ruilt-In Test		
Bqu!pment		-

	UNI	OFV23H IFD				
Program Element: #6.43.14.A		Title: Multiple Launch Rocket System (:ILRS) Formerly Known A				
DOD Mission Area: #212 - Fire Suppo	ert	General Support Rocket System (GSRS) Budget Activity: 14 - Tactical Programs				
(U) Operational/Technical		Demonstrated				
Characteristics	Objectives	Performance				
- % of items removed with no						
evidence of failure	7%	$\frac{1}{2}$				
- % Fault Isolation	90%	<u>1</u> /				
- % Maintenance Actions Corre	cted	THD				
within specified mean						
time to repair	TBD					
(U) Maintainability						
- SPLL (MTTR/Hours)						
Organizational	1.10	.785				
Direct/General Support	4.40	1.5-2.1				

NOTE: -(0) To be verified by the developer and independent test agency.

UNCLASSIFIED

11-353

11.4 1 9

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6,43.16.A DOD Mission Area: #211 Close Combat

Title: Fire and Forget - HELLFIRE
Budget Activity: #4 - Tactical Programs

THIS DESCRIPTIVE SUMMARY WILL BE SUBMITTED UNDER A SEPARATE COVER.

UNCLASSIFIED

FY 1982 RDTE CONCRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6,43.18.A DOD Mission Area: #211 - Ground Air Defense Title: Division Air Defense (DIVAD) Cun Budget Activity: #4 - Tactical Program

THIS DESCRIPTIVE SUMMARY WILL BE SUBMITTED UNDER A SEPARATE COVER,

11-355

RALL F

AD-A101 306 DEPUTY CHIEF OF STAFF FOR RESEARCH DEVELOPMENT AND AC--ETC F/6 5/1 DESCRIPTIVE SUMMARIES OF THE RESEARCH DEVELOPMENT TEST & EVALUA--ETC(O) JAN 81 UNCLASSIFIED NL. 5 or 6 AL AIDL306

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 46.43.21.A
DOD Mission Area: 7255 Tactical Surveillance, Reconnaissance
and Target Acquisition

Title: Joint Tactical Fusion Program

Budget Activity: 14 - Tactical Programs

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

Project Number	Till: Tofat, for program element	FY 1980 Actual 7900	FY 1981 Estimate 10260	FY 1982 Estimate	FY 1983 Estimate To be de- termined (TBD	Additional to Completion TBD	Total Estimated Cost T80
D926	All Source Analysis						
(System (ASAS)	7900	10260		Not Shown	Continuing	Not Applicable

- 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 attrition. 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 Echelous above Corps to analyse, correlate, fuse and report intelligence data from numerous tactical and strategic sensor systems; provide target nominations; and manage and control intelligence/electronic warfare assets.
- C. (U) BASIS FOR FY 1982 REQUEST: Includes funds to support Congressional redirection of the Battlefield Exploitation and Target Acquisition (BETA) Project, the All-Source Analysis System (ASAS) and related Air Force projects into a Joint Tactical Fusion program, and the continuation of that program toward fielding of service systems. Total development costs have not been validated due to timeframe since official program initiation (December 1980). Total funding profile and major milestones will be developed as part of program acquisition strategy to be completed by June 1981.

11-356 (1, 31 Mar 81

164 6

Program Element: #6.43.21.A

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

Title: Joint Tactical Fusion Program

Budget Activity: 14 - Tactical Programs

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

	PY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current					
requirements)	7900	10260		To be determined (TBD)	TBD
Funds (as shown in FY 198	į. *				
submission)	4200	10167			

*In FY 1981 and prior, these funds were included in P.E. 6.47.45.A., Tactical Electronic Support Measures Systems, under Project D926, Tactical EWI Command and Control Systems.

FY 1980: \$3700 was reprogramed into this project as a result of Congressional approval for project BETA requirement.

FY 1981: The funding level difference is attributable to internal budget adjustments.

FY 1982: The funding level difference is attributable to the initiation of the Joint Tactical Fusion (JTF) Program and costs inclient to supporting JTF program management, JTF simulation efforts, operational testing and joint exercises participation, fabrication of RDTE prototypes, and continued software development.

E. (8) OTHER APPROPRIATION FUNDS: Not applicable.

11-357 C1, 31 Mar 81

Program Element: #6.43.21.A DOD Mission Area: #255 Tactical Surveillance, Reconnaissance and Target Acquisition

Title: Joint Tactical Fusion Program Budget Activity: #4 - Tactical Programs

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 and high volume of sensor information and effectively control and manage organic sensor and electronic warfare assets. The purpose of this program is to develop and field 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

; provide ground battle situation displays; provide target nomination and intelligence support; and manage and control sensor/electronic warfare assets. The Services have submitted a Joint Tactical Fusion
Development and Acquisition Program Plan to the Office of the Secretary of Defense (OSD) which combines the Battlefield
Exploitation and Target Acquisition (BETA) Project, The Air Force Automated Tactical Fusion Division (ATFD) Program, the Army All-Source Analysis System (ASAS)/TCAC-D Programs, and associated simulation projects into a joint acquisition effort, now called the Joint Tactical Fusion Program. The plan, approved by OSD and submitted to Congress in December 1980, describes a program to acquire systems for the Services at the earliest possible date through a joint effort to ensure interoperability within and among Services. The joint acquisition effort will make maximum use of the investments in the BETA, ASAS, and Technical Control and Analysis (TCAC) projects by incorporating their architecture and technologies into the development of the joint fusion system. The joint Tactical Fusion Development and Acquisition Program Plan will become the basis upon which to generate a program development plan and a system acquisition strategy under the Army-the designated lead Service. Subject to modification as a result of the Joint Fusion Program strategy, the evolution of the ASAS will be based upon incremental improvements that are supported by technological advances and field experience, and are in consonance with DOD Directive 5000.1 and Instruction 5000.2. (For further information see Program Element 6.37.45.A., Tactical Electronic Support Measures Systems, Project D925, Tactical EWI Command and Control Systems.)

G. (U) RELATED ACTIVITIES: Related Service activities will be combined and redefined upon implementation of the Joint Tactical Fusion Program. These activities include BETA, ATFD, ASAS, Technical Control and Analysis Center (TCAC) and Associated Simulation Projects. The following current related services/agencies program elements (PE) apply: 6.43.21.F,

Joint Tactical Fusion Program; 2.74.31.F, Tactical Air Intelligence System Activities; 6.47.10.F, Reconnaissance/Electronic
Warfare Equipment; 6.27.11.E, Experimental Evaluation Major Innovative Technology; 6.47.45.N, Navy Integration/BETA; 6.37.45A, Tactical Electronic Warfare and Intelligence Command and Control Systems; and 3.58.85G, Tactical Cryptologic Program.

11-358 C1, 31 Mar 8!

' dia 20

Program Element: #6.43.21.A

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

Title: Joint Tactical Fusion Program
Budget Activity: #4 - Tactical Programs

H. (U) WORK PERFORMED BY: Current major contractors are: TRW, Incorporated, Redondo Beach, CA; BDM, Incorporated, McLean, VA; Bunker-RAMO Corporation, Westlake Village, CA; RCA Corporation, Burlington, MA; HRB-Singer, State College, PA; 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; the BETA Joint Project Office, Adelphi, MD; and Project Manager, All-Source Analysis Systems, Vint Hill Farms, Warrenton, VA.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. FY 1980 and Prior Accomplishments: A joint service and Defense Advanced Research Projects Agency (DARPA) project, Battlefield Exploitation and Target Acquisition (BETA), was initiated to develop and demonstrate the feasibility of automated correlation and display of sensor-derived information to support near-realtime target nomination and battle management at Army Corps, Division, and in the Air Force Tactical Air Control Center. Specifications were prepared and approved for fabrication of Division Level Technical Control and Analysis Centers (TCAC(D)) on a Quick Readtion Capability. (QRC) basis to provide an initial semiautomated signals intelligence/electronic warfare control and analysis.capability pending fielding of the All-Source Analysis System. The TCAC(D) is scheduled for a deployment, and field experience gained with it will contribute to the engineering development phase of ASAS. Project BETA testbeds were scheduled to be deployed to Europe to conduct an operational evaluation. However, the testbeds were not stable and did not successfully pass the systems integration test. As a result OSD and Congress opted not to deploy. The remaining project focus will be on correcting testbed deficiences and completion of software development.
- 2. (U) FY 1981 Program: The Joint Tactical Fusion Program will be initiated. Development and acquisition strategy will be finalized and implemented. All efforts and funding will be directed towards joint Service development and acquisition of tactical systems for earliest possible fielding. The FY 1981 effort will focus on performing syst ms engineering/integration functions; generating the Statement of Work and specifications and preparation of the dequests for Proposals for hardware; continuing software development; and continuing development of the simulation program to support development during testing and operational exercises. Service operational testing on the fusion testbed will be conducted to refine requirements for their systems (ASAS/ATFD).
- 3. FY 1982 Planned Program: Pending revisions based on the Joint Tactical Fusion Program stratery, the request for proposal will be released. Simulation development will continue. The fusion testbeds (BETA) will be available for use in Joint Service exercises to evaluate techniques, procedures, and benefits of multiservice sensor data distribution and correlation for development of software to be used in the ASAS and ATFD. Engineering development will begin on the initial

Program Element: 6.43.21.A
DOD Mission Area: 7255 Tactical Surveillance, Reconnaissance and Target Acquisition

Title: Joint Tactical Fusion Program

Budget Activity: 14 - Tactical Programs

ASAS and ATFD. Authorization for full-scale development is essential even though all prescribed conditions have not been met if an initial ASAS capability is to be fielded in support of highly automated sensors by 1985. This decision is appropriate because sufficient conditions will have been met to demonstrate, test, and accept the ASAS SEWS/TCAC(D)/BETA software and hardware technology such that an engineering development (ED) contract can be awarded for the integration and fusion of these software increments into the initial ASAS and the ATFD.

- 4. (U) FY 1983 Planned Program: Pending revisions based on the Joint Tactical Fusion Program strategy, a contract to develop production prototype hardware sets of the Initial ASAS will be awarded. Development of the terminal and software will continue.
- 5. Program to Completion: Pending revisions based on the Joint Tactical Fusion Program strategy, development of production prototypes of the Initial All-Source Analysis System (IASAS) will be completed, fielded, and tested. Limited production of the IASAS will be initiated and completed. Software evolution will continue. Objective ASAS evolution and acquisition will begin with projected IOC

11~360

1 174 19

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.01.A DOD Mission Area: #211 - Close Combat Title: Infantry Support Weapons
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 4546	FY 1981 Estimate 3878	FY 1982 Estimate 11973	FY 1983 Estimate 6183	Additional to Completion Continuing	Fotal Estimated Cost Continuing
D029	Lightweight Company Mortar Systems (LWCMS)	975	216	1130	1368	1281	3 208 2
DO 30	Multipurpose Ammunition	9	1025	1368	1405	0	37 9 8
D144	Smoke Mortar Rounds	0	0	2543	1717	Continuing	Continuing
D227	Battalion Mortar System	3571	2637	4226	0	0	19133
D031	25mm Ammo PIPS	0	,o	2706	1693	0	4399

B. (U) BRIEF DESCRIPTION OF BLEMENT AND HISSION NEED: This program supports development to improve the performance and effectiveness of Army mortar systems and other infantry support weapons. Mortar systems provide the small unit ground commanders at the company and battalion levels with their own responsive, high-angle, indirect fire support capability. The foliam Lightweight Company Mortar System (LMCMS) provides the company commander in nonmechanized infantry units with a lightweight, responsive, easily transportable indirect fire weapon capable of delivering both high explosive (HE) and illumination fires in offensive and defensive missions. The Slam battalion mortar system will provide the battalion commander in nonmechanized units and the company commander in mechanized units with a weapon capable of achieving greater range, greater lethality, a higher sustained rate of fire, improved stability, and enhanced illumination over the current Slam mortar. The current smoke cartridges for the Slam mortar and 4.2" battalion heavy mortar, in use since the 1940's, are lacking in screening capability. The addition of a long-lasting screening smoke cartridge at the battalion level will provide the ground commander with a greatly improved battlefield obscuration capability. Multipurpose ammunition employs a fuzeless technology developed in Norway to provide a significant increase in explosive and incendiary effects against light armor and aircraft targets at a reduced cost. Rights to produce this ammunition have been obtained to facilitiate application of the technology to US weapons. This fuzeless ammunition technology will be developed in 25mm and other caliber sizes for triservice application. Project D031, a new start in FY82, will improve the ammunition shipping container, provide an APDS-T practice round, and modify the XH758 fuze for the 25mm BUSHMASTER family of ammunition.

UNCLASSIFIED

11-361

1. R4 1 P

Program Element: #6.46.01.A DOD Mission Area: #211 - Close Combat

Ticle: Infantry Support Weapons
Budget Activity: 14 - Tactical Programs

C. (U) BASIS FOR FY 1932 RDTE REQUEST: The request for Project D029, Lightweight Company Mortar System, will permit initiation of engineering development (ED) of the XM721 illumination round. The request for Project D227, Battalion Mortar System, will permit completion of testing, correction of shortcomings discovered during testing, the integration of logistics support, the preparation of the Technical Data Package and incorporation of Producibility Engineering and Planning. The request for project D039 will permit the engineering development of multipurpose fuzeless technology in 25mm and other calibers. The request for Project D031 provides for a much lighter weight (plastic) ammunition shipping box which will save 200 pounds on the IFV and 400 pounds on the CFV. In addition, the FY82 25mm PIP will provide an APDS-T practice cound ballistically matched to the AP service round out to its maximum effective range and modification of the XM758 fuze to enhance its range terrain functioning. enhance its range terrain functioning.

Project	Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
0029	Type Classification 60mm Training Round	3Q FY 1980	4Q Fy 1979
DO29	Type Classification for XM745 Gutted Multioption Fuze	4Q FY 1981	None Shown
0030	Type Classification	FY83	FY83
D144	Type Classification 81mm Smoke Round	4Q FY 1983	4Q FY 1985
D227	Acquire 18 Test Weapons	1Q FY 1979#	10 FY 1979
	Begin Development Test/	4Q FY 1981**	4Q FY 1979
	Operational Test (DT/OT)	2Q FY 1982***	2Q FY 1980
	Complete DT/OT	2Q FY 1982	2Q FY 1980
	Development Acceptance IPR	3Q FY 1982***	3Q FY 1980
	Type Classification	3Q FY 1982***	3Q FY 1980
	Initial Operation Capability	1Q FY 1985***	3Q FY 1982

Difference due to initiation of engineering development in FY 1981 instead of FY 1982. Funds for FY 1981 initiation

will be obtained by reprograming within Development and Readiness Command resources.

** DT began as scheduled but was suspended because of misfires and short round problems with ammunition at extreme temperatures. DT II was again suspended in January 1980 due to blast overpressure and wet efficiency. A special review in May UNCLASSIFIED

Program Element: #6.46.01.A DOD Mission Area: #211 - Close Combat

Title: Infantry Support Weapons
Budget Activity: 14 - Tactical Programs

1980 recommended a codevelopment contract be negotiated with the UK to resolve the blast overpressure problem. The United Kingdom will demonstrate solutions for wet efficiency/overpressure in March 1981. Subsequently, a program decision on the feasibility of a codevelopment effort, DT II/OT II, and type classification will be made based upon time requirements and fiscal resources.

*** Difference due to problems with ammunition during DT which resulted in a two-year program slip.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	4546	3878	11973	Continuing	Continuing
Funds (as shown in FY 1981 submission)	5809	4273	4262	9188	59342

Differences between FY 1981 and FY 1982 submit: Reduction in FY90 resulted from reprograming to higher priority Army projects. The FY81 decrease is attributable to the application of general congressional reduction.

Increase in FY82 includes initia-

tion of development of an illumination round for the Lightweight Company Mortar, a significant increase in project D227 to resolve the blast overpressure problem with the improved 81mm mortar and provide for DT/OT testing and development testing of the 81mm 111umination round, and initiation of a 25mm Product Improvement Program (PIP).

UNCLASSIFIED

in a distribution

Program Element: #6.46.01.A

DOD Mission Area: #211 - Close Combat

Title: <u>Infantry Support Weapons</u>

Budget Activity: <u>#4 - Tactical Programs</u>

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

	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Weapons and Tracked Combat						
Vehicles, Army						
Mortar, 81mm, XH252						
Funds (current requirements)	0	0	8300	18500	27400	54200
Funds (as shown in FY 1981						
submission)	0	14900	20000	-	7100	42000
Quantitles (current requirements)	0	0	300	636	883	-
Quantities (as shown in FY 1981						
submission)	0	742	939	-	325	

Differences due to an additional one-year slip in proposed procurement of the UK Slumm mortar because of overpressure and wet efficiency problems in testing. Cost increases are due to increase in sales price from UK and devaluation of the dollar against the British pound.

Lightweight Company Mortar (LWCMS), M224	•					
Funds (current requirements)	0	0	0	0	0	1 1400*
Funds (as shown in FY 1981						
submission)	0	Ó	0	0	0	13800

^{*} Total cost reduction due to favorable contract on sight for the Lightweight Company Mortar System. The estimate was for about \$1700 unit cost; contract was for about \$1000 unit cost.

UNCLASSIFIED

11-364

..

Program Element: #6.46.01.A
DOD Hission Area: #211 - Close Combat

Title: Infantry Support Weapons
Budget Activity: 44 - Tactical Programs

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Quantities (current requirements)	0	0	0	0	0	-
Quantities (as shown in FY 1981 submission)	0	0	0	0	0	-
Difference in funding due to more curre	nt cost esi	imates.				
Procurement Ammunition, Army						
Cartridge, 60mm, LWCMS, All types						
Funds (current requirements) Funds (as shown in FY 1981	o	0	17100	0	*	22900**
submission)	20800	0	33000	0	-	134600
Quantities (current requirements)	0	0	164000	0	*	-
Quantities (as shown in FY 1981	28200	0	28200	-	-	-
submission)	-	-	-	-	-	-
Cartridge, 81mm, Improved						
Funds (current requirements) Funds (as shown in FY 1981	0	. 0	0	34900	*	349300**
submission)	-	26300	-	-	-	165800
Quantities (current requirements) Quantities (as shown in FY 1981	0	0	0	136000	*	-
submission)	-	136000	-	-	-	-

^{*} Cost to completion not estimated for ammunition since procurement is continuous based on usage.

** Represents total five-year defense program requirements (FY82-86).

UNCLASSIFIED

11-365

184 1 2

Program Element: #6.46.01.A DOD Mission Area: #211 - Close Combat Title: Infantry Support Weapons
Budget Activity: 4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Lightweight Company Mortar System (LWCMS) consists of an improved 60mm mortar, conventional style fire control, high explosive ammunition fuzed with a new M734 multioption electronic fuze, and the X745 training force (gutted M734 multioption fuze). Illuminating ammunition will be developed. The Lightweight Company Mortar System fulfills the requirement to provide a manportable fire support system at the company level for nonnechanized units and will replace the 81mm mortar in all infantry units except mechanized infantry. Even though the 47-pound mortar and 3.75-pound round of ammunition weigh less than half the present 95-pound 81mm mortar and nine-pound round of ammunition, the lethality of the 1M MS equals about 70% of the 31mm mortar per round. The mortar can be fired out to 1000 meters using a small biseplate and no bipod, or out to 3500 meters using the standard baseplate and bipod. The new illuminating round will have a sufficient range to illuminate targets being engaged with the high explosive (IE) cartridge at maximum range (3500 meters). The 81mm smoke screening cartridges will provide greater screening capability. The Battalion Mortar System will provide an improved 81mm mortar capability of increased range, increased lethality, greater accuracy, and a higher sustained rate of fire than the current 81mm mortar. The improved 81mm mortar will fire newly developed ammunition to a range of approximately 5700 meters. The United Kingdom (UK) Li6A2 Binm mortar will fire newly developed ammunition to a range of approximately 5700 meters. The United Kingdom (UK) Li6A2 Binm mortar will fire newly developed ammunition to a range of approximately 5700 meters. The United Kingdom (UK) Li6A2 Binm mortar will fire newly developed ammunition to a range of approximately 5700 meters. The United Kingdom (UK) Li6A2 Binm mortar will fire newly developed ammunition to a range of approximately 5700 meters. The United Kingdom (UK) Li6A2 Binm mortar will provide a major increas

G. (II) RELATED ACTIVITIES: These developments will also satisfy the US Harine Corps' requirements for a mortar and mortar ammunition. Full coordination of this development with the Marine Corps continues. Program Element (PE) 6.36.08.A, Weapons and Ammunition, Lightweight Company Mortar System (LWCMS), supported advanced development of the LWCMS except for the multioption fuze. PE 6.36.13.A, Advanced Fuze Design, supported the advanced development of the multioption fuze, XM734. PE 6.46.02.A, Field Artiliery Ammunition, supported engineering development of the fuze initially until it was transferred to this PE in FY 1974. PE 6.36.13.A, Advanced Fuze Design, supported the advanced development of an electronic time fuze for one year in FY 1976 in order to demonstrate that technology is in hand to provide an electronic time fuze for the LWCMS illustinating round. PE 5.36.27.A, Combat Support Munitions, supports advanced development of 81mm smoke mortar round. The UK L16A2 evaluation has undergone feasibility testing under PE 6.57.09.A, Exploitation of Foreign Weapons. The multipurpose

IINCLASSIFIED

11 366

Program Element: #6.46.91.A DOD Mission Area: #211 - Glose Combat Title: <u>Infantry Support Weapons</u>
Budget Activity: #4 - Tactical Programs

ammunition has been evaluated under PE 6.26.17, Small Caliber and Fire Control Technology, and PE 6.57.14D, International Materiel Evaluation.

H. (U) WORK PERFORMED BY: In-house efforts are accomplished by US Army Armaments Research Development Command, Dover, NJ; and US Army Test and Evaluation Command, Aberdeen, MD.; Watervliet Arsenal, Watervliet, NY; and Harry Diamond Laboratories, Adelphi, MD. Major contractors are: Eastman Kodak, Rochester, NY; Bergman Manufacturing, Garland, TX; Ruoff, Inc., Runnemede, NJ; Norris Industries, Los Angeles, CA; International Telephone and Telegraph Research Institute, Chicago, IL; the United Kingdom Royal Ordnance Factories; and A/S Raufoss Ammunisjonsfabrikker, Norway.

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Lightweight Company Mortar System (LWCMS): The basic LWCMS, high-explosive round, and revolutionary new multioption fuze were fully developed and type classified standard in Jaiy 1977. Engineering development work was completed on the subcaliber training round and it was type classified in June 1980. In FY78 producibility Engineering and Planning (PEP) on the M734 multioption fuze was completed and resulted in lower procurement costs. In FY79 engineering development was initiated on the XM745 multioption training round fuze. Shacke Mortar Rounds: Advanced development on the 81mm smoke round was undertaken in Combat Support Munitions, Program Element (PE) 6.36.27.A, Combat Support Munitions, Project DE82. A draft requirements document for a 4.2-Inch smoke screening round was approved. Battalion Mortar System: A US Army Test and Evaluation Command (TECOM) feasibility test of the UK 81mm L16A2 mortar system in the October 1976-April 1977 timeframe, supported a full test and evaluation of the UK system as a candidate to fulfill the Improved 81mm Mortar Required Operational Capability (ROC). Eighteen mortars and 16,700 rounds were procured from UK to conduct development test/operational test (OT/OT) testing. Harry Diamond Laboratories (HDL) contracted with Eastman Kodak to buy M734 multioption fuzes (MOF) to test their adaptation to both the US and UK 81mm cartridges. Two UK mortars and 600 rounds of UK XL31E2 ammunition were acquired for the compatibility tests which demonstrated the adaptation of the M734 to the UK 81mm mortar cartridge. Tests are continuing with the US cartridges. Four M125Al 81mm mortar cartriers, modified versions of the M113 armored personnel carrier, were converted to carry the UK system and delivered for test. Analysis of the mortar tube design and material was conducted by Benet Weapons Laboratory of the Armaments Research and Development Command (ARRADCOM). Development Testing (DT) was commenced in October 1978 at Aberdeen Proving Ground, MD, and t

UNCLASSIFIED

11-367

124 1 18

Program Element: #6.46.01.A DOD Mission Area: #211 - Close Combat Fitle: Infantry Support Wespons
Budget Activity: #4 - Tactical Programs

the blast overpressure problem. Development of the 81mm Illumination round was initiated with acquisition of components for testing. The United Kingdom will demonstrate solutions for wet efficiency/overpressure in March 1981. Subsequently, a program decision on the feudibility of a codevelopment effort, DT II/OT II, and type classification will be made based upon time requirements and fiscl resources.

- 2. (U) FY 1981 Program: Lightweight Company Mortar System: Engineering Development and Testing (DT II) of the XH745 gutted multioption fuze will be completed. Smoke Mortar Round: Due to concept problems in developing the 81mm mortar smoke round, this project will remain in advanced development. Honey is scheduled to be reprogramed into higher priority projects. Buttailion Mortar System: The United Kingdom will demonstrate the feasibility of a solution to the overpressure/wet efficiency problems. If approved, a codevelopment effort with the UK will result in the design, fabrication, and test of an overpressure attenuation device and improvement in the high-explosive round; and in the conduct of selected portions of development testing (DT II). Mounts for vehicle application will be developed, fabricated, and tested. Integrated Logistic Support Items will be updated. Component testing of the 81mm illumination round will be conducted. Multipurpose Ammunition: Multipurpose technology will be translated, and test cartridges in 25mm, 20mm, and 50 caliber will be fabricated to support initial engineering design tests.
- 1. (U) FY 1982 Planned Program: Lightweight Company Mortar System: Engineering Development will be initiated on the XM721 filiumination Round. Smoke Mortar Round: Due to concept problems in developing an 81mm mortar smoke round, this project will remain in advanced development. Battalion Mortar System: Development Test II, Operational Test II, and operational climatic testing will be conducted to evaluate technical data and performance characteristics of the system. These tests will be conducted by the Test and Evaluation Command (TECOM) and the Operational Test and Evaluation Command (OTEA). Subsequently, a Development Acceptance In-Process Review will be held to determine whether the system meets the requirements and should be type classified and procured. All elements of Integrated Logistic Support will be completed. The Technical Data Package will be prepared and a productibility, engineering, and planning effort undertaken for US production of the 81mm high explosive round. Complete round testing, confirmation testing, and procurement of Development Test II rounds will be accomplished for the 81mm illumination round. Multipurpose Ammunition: Engineering design test of the 25mm, 20mm, and 50 caliber ammunition will be conducted. Testing will include alternate explosive fill, interoperability, and tracer improvement. The design engineering effort for the 25mm product improvement will reduce vehicle weight, improve ammunition performance, and achieve cost effectiveness.
- 4. (U) FY 1983 Planued Program: Lightweight Company Mortar System: Development of the XM721 illumination round will continue. Smoke Mortar Round: The Simm smoke screening round will enter engineering development. All necessity experimental work will be performed, and the proposed system will be ready for full-scale development. Battalion Mortar System:

UNCLASSIFIED

Program Element: #6.46.01.A DOD Mission Area: #211 - Close Combat Title: Infantry Support Weapons
Budget Activity: 44 - Tactical Program.

Development Testing II and Operational Testing II for the 91mm Illumination round are a recognized requirement although no funds are currently programed for this effort. Multipurpose Ammunition: Work on 20mm, 25m, and 50 of liber will continue with fabrication of hardware and conduct of DT II. Type classification of these projecties is expected in late FY 1983. Preliminary work will be initiated on the selected caliber (35mm or 40mm) for the DIVAD gun. Project 1030 is completed in FY 1983.

5. (U) Program to Completion: Lightweight Company Mortar System: Completion of development of the 60mm illumination round is planned. Smoke Mortar Round: 81mm smoke screening rounds will be tested and evaluated, with type classification scheduled for 4QFY85. Battalion Mortar System: DT II/OT II evaluation for the 31mm illumination round will be completed and the round type classified standard in 2QFY84.

FY 1982 ROTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.03.A

DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare

Title: Nuclear Munitions
Budget Activity: 14 - Tactical Program

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 23077	FY 1981 Estimate 11379	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
0 185	Improved 155mm Nuclear Projectile	18998	9153				
8584	Command Control and Security Systems	200	216				
11663	Improved 8-in Nuclear Projectile	3879	1810				

* Warhend quantities exceed the classification of this document.

** Total thousand is in the FY 1982 Budget Amendment.

BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The mission of the Theater Nuclear Force (TNF) is to deter both nuclear and conventional attack by enemy forces, and should deterrence fail, to support the defense of the theater. This mission requires Army nuclear weapons that are controllable, effective, discriminant, and survivable.

11-370 - C1, 31 Mar 81

1.00

Program Element: #6.46.03.A DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare Title: Nuclear Munitions
Budget Activity: #4 - Tactical Program

This program element is the foundation of the program to complete the modernization of the Army's battlefield nuclear weapons by improving the 3-inch and 155mm artillery-fired atomic projecties (AFAP). Modernized AFAP will provide the critically needed reserve of combat power to ensure numerically inferior US and NATO forces are not defeated. They also provide the ability to tailor nuclear support for contingency force operations in mon-NATO theaters. Because AFAP's are controllable and usable, their presence provides a real threat to enemy forces, reducing their effectiveness in massing to conduct a conventional battle. The NATO cannon artillery force structure is predominantly (80%) 155mm, and the 3-inch AFAP alone or with the old 155mm AFAP will not provide an adequate cannon-delivered nuclear capability. The combined US and non-US NATO forces have only about deployable 8-inch cannon, versus approximately deployable 155mm cannon. Some countries maintain only a token number of 8-inch cannon (e.g., and others have

The 155mm AFAP program is the only nuclear program that has been developed in conjunction with, and in consideration of, the Allied interest. A modernized nuclear projectile capability is required to replace the 155mm and 8-inch artillery-fired atomic projectiles (AFAP) currently available for NATO forces. The mission need for the improved 155mm Nuclear Projectile is developed in additional detail in the D355 Project Discriptive Summary. RDTE on the improved 155mm Nuclear Projectile will be completed with the transition to production in FY 1981. Fielding of the 155mm and 8-inch AFAP will enhance the survivability and effectiveness of US and NATO TNF. All modernized weapons will have a command disable system that will prevent the weapon from being used in its intended mode; however, an improved capability is required to deny unauthorized access to weapons currently stockpiled, as well as newer weapons, when they are threatened by capture from a nontactical stockpile storage configuration. Prototype w

C. BASIS FOR FY 1982 RDTE REQUEST: The Improved Nuclear Projectile program was initially deferred in FY 1982 but has been reestablished by the FY 1982 Budget Amendment. FY 1982 funds requested will provide for initiation of production of hardware for Developmental Testing - Operational Testing, Phase II (DT/OT II), initial system safety study, maintenance evaluation, and new equipment test part of DT II for the Improved 155mm Nuclear Projectile, and initial system effectiveness evaluation of alternative weapon access denial systems installed in FY 1981 with Defense Nuclear Agency funds for the Command, Control and Security Systems Project. No FY 1982 RDTE funds are requested for the XM753/W79 Improved 8-inch Nuclear Projectile project which will be in its second year of quantity production for the stockpile.

11-371 or, 31 Mar 81

Program Element: #6.46.03.A

DOD Missim Area: #241 - Battlefield Theater Nuclear Warfare

Title: Nuclear Munitions Budget Activity: 14 - Tactical Program

Major Milestones

Current Milestone Dates Milestone Dates Shown in FY 1981 Submission

Improved 155mm Nuclear Projectile Initial Operational Capability

Command, Control and Security System Initial Operational Capability

See below

None specified, see below

improved 8-inch Nuclear Projectile Initial Operational Capability

Approving the Budget Amendment for the Improved 155mm Nuclear Projectile project in FY 1982 will ensure achieving an Initial Operational Capability in and The Command, Control, and Security Systems project objective was redefined in late FY 1980 from disablement system hardware development to weapon access denial system hardware development.

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

	FY 1950	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	23077	11379			
Funds (as shown to FY 1981 submission)	25646	12241			

- (II) The \$2569 thousand decrease in FY 1980 is a result of:
- (U) D385 Reprogramed \$2269 thousand unexpected funds made available by the leveling of project effort following the sharp reduction in the FY 1981 effort.
- (II) 0584 Reprogramed \$3000 thousand to higher priority Army requirements.

11-372 (1, 31 Mar 81

1.664.1.4

Program Element: #6.46.03.A

DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare

Title: Nuclear Munitions
Budget Activity: 44 - Tactical Program

- (U) D663 No Changes.
- (U) The \$862 thousand decrease in FY 1991 is a result of:
- (U) D385 The FY 1981 decrease reflects the application of general Congressional reductions.
- (U) D584 The FY 1981 decrease reflects the application of general Congressional reductions.
- (U) D663 The FY 1981 decrease reflects the application of general Congresssional reductions.
- (U) The \$100 thousand decrease in FY 1982 is a result of:

D385 - Deferring project resulted in a \$34140 thousand decrease; but the FY 1982 Rudget Amendment restored thousand for a net decrease of \$1140 thousand in this project. (see D385 Project Descriptive Summary.)

- (U) Redefinition of project (see paragraph c, above) produced a \$1040 thousand increase.
- (U) D663 No funds required.

11-373 (4), 31 Har 81

Program Element: #6.46.03.A DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare

Title: Nuclear Munitions Budget Activity: 14 - Tactical Program

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

	FY 1980 Actual	FY 1981 Estimate	FY 191 Estima			Tota tional Esti- ompletion Cost	nated
Ammunition Procurement, Army 155mm							
Funds (current requirements)	0	0					
Funds (as shown in FY 1981							
subatssion)	n	0					
Quantities (current requirements) Quantities (as shown in FY 1981	**	**					
submission)	**	**					
Ammunition Procurement, Army - 8-inc	h:*						
Funds (current requirements)	19200	19700					
Funds (as shown in FY 1981 submission)	17800	19800					
Department of Energy-Defense Program	s (DOE-DP)		Energy Re	search and	Development	Agency, formerly	Atomic Energy
Commission)					-		
155mm nuclear nuclear Projectile	***	***	***	***	***	**	
8-Inch Projectile	***	***	***	***	***	***	

- Department of Defense Muclear Weapon Components only. Warhead quantities exceed classification of this document.
- *** DOE-DP buiget figures exceed classification of this document.

The \$6100 thousand increase in total estimated procurement costs for the Improved 155mm Nuclear Projectile from FY80 to FY81's due to \$52100 thousand increase due to excess inflation beyond FY 1980 indices and FY 1981 Baseline Cost Estimate increases offect by a \$46000 reduction due to a \$5% stockpile quantity decrease in accordance with the FY 1982 Amended Program Decision Hemorandum. The FY 1981 Baseline Cost Estimate increases are detailed in paragraph 07 of the D185 Project Descriptive Summary. The \$14400 thousand increase in total estimated procurement costs for the Improved 8-inch Nuclear Projectile from FY80 to FY81 is due to inflation to FY 1980 constant dollars, 30% and greater increases in electronic costs,

11-374 C1, 31 Mar 81

104 19

Program Element: #6.46.03.A DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare Title: Nuclear Munitions
Budget Activity: 14 - Tactical Program

the addition of prescribed under load containers, the addition of limited life component exchange vans, and the addition of alternate fuze setter power supplies.

UNCLASSIFIED

Program Element: #6.46.03.A
DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare

Title: Nuclear Munitions
Sudget Activity: #4 - Tactical Program

F. DETAILED BACKGROUND AND DESCRIPTION: The objective of this program is modernization of the Army's battlefield nuclear weapons to improve their real warfighting capability against the growing Soviet-Warsaw Pact armored forces, and thereby improve their deterrent value. Deterrence of armed aggression results from the enemy offensive planners' net assessment that their military operations will not succeed. This effect is produced by battlefield theater nuclear forces that are effective, discriminatory, controllable, and survivable. The potent reserve of combat power provided by battlefield nuclear weapons, particularly artillery-fired atomic projectiles (AFAP), and the linkage to strategic systems they imply are two of the most important elements that deter Warsaw Pact attack in Central Europe and Soviet military adventurism around the world. By their presence and possible use on the battlefield, US battlefield nuclear weapons will force an enemy to deploy his forces in a reduced mass posture that will decrease their effectiveness in conventional combat. The Army modernization program improves the deterrent value of Army nuclear weapons and reduces the likelihood of a conflict that would lead to nuclear war. The nuclear capability for the LANCE missile and 8-inch howitzer was modernized in preceding years, and these weapons are being finished beginning in capacitively. The major effort required in FY 1982 and outvears is the modernization of the 155mm nuclear capability. The furrent 155mm AFAP is give paragraph A, D385 Project Descriptive Summary). It employs early

1950's nuclear technology

The modernized 155mm AFAP will be a lighter projectile, stressed for twice the launch setback forces and, with rocket-assist, will achieve ranges that allow standoff from the Soviet cannon artillery. The modernized weapon will have a yield times greater than the old 155mm projectile, and will provide times the lethal coverage. The new projectile will have a fuze to produce a precise height-of-burst with greater assurance of precluding fallout. Firing data corrections derived from the conventional ammunition being fired will reduce delivery probable errors by more as compared to the calculated corrections for the current 155mm AFAP. Sinally, command, and control on the new weapon will be provided by an electromechanical multiple-code permissive action link (PAL) instead of a mechanical lock, and weapon security will be improved by an integral, nonviolent command disable system. The command, control, and security system project is to develop and evaluate security system components and their integration into improved nuclear weapon access denial systems to improve the security of overseas nuclear weapon storage sites. The purpose of these systems will be to impose a guaranteed minimum delay for security backup forces to react to engage unauthorized afte intruders. These systems will consist of active and passive devices functioning in synergism to impede the access to or removal of nuclear weapons in storage. This program (LRSP)(storage site upgrade).

G. (U) RELATED ACTIVITIES: The development of improved nuclear projectiles is a joint Department of Defense (DOD) and Department of Emergy-Defense Programs (DOE-DP) undertaking. In addition, the 8-inch nuclear projectile (Project D663) uses

[1-376

Program Element: #6.46.93.A
DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare

Title: Nuclear Munitions
Budget Activity: #4 - Tactical Program

the rocket motor developed for the M650 conventional 8-inch projectile (SSN E66600). The M650 is the conventional ballistic mate that will be used to derive firing data corrections for the XM753. Much of the electronic technology and production expertise developed for the 8-inch fuze will be applicable to the 155mm fuze. The command, control, and security systems project is being done in coordination with and is sponsored in FY 1981 by the Defense Nuclear Agency, Theater Nuclear Forces, Security, and Survivability (TNFS-) Program. All Army nuclear munitions projects are coordinated through the Project Manager for Nuclear Munitions as well as the Army Staff to preclude duplication of effort.

II. (U) WORK PERFORMED BY: US Army Research and Development Command (ARRADCOM), Dover, NJ; Harry Diamond Laboratories, Adelphi, MD; trmy Materiel and Mechanics Research Center, Watertown, MA; Ballistics Research Laboratory, Aberdeen, MD; Department of Energy-Defense Program activities and contractors in Germantown, MD; Albuquerque, NM; Amarillo, TX; Kansas City, MO; Los Alamos, NM; Las Vegas, NV; Livermore, CA; Denver, CO; Aiken, SC; Ferrulmatics Inc., Patterson, NI; Chamberlin Corporation, Waterloo, LA; Motorola Corporation Incorporated, Scottsdale, AZ. (See also 0385 Project Descriptive Summary.)

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. FY 1980 and Prior Accomplishments: Redesign of the LANCE warhead adaption kit to support a Department of Energy (DOE) in-production change to the reduced blast/enhanced radiation (RB/ER) W70 MOD 3 warhead and its non-RB/ER version, W70 MOD 4 warhead was completed in FY 1981. Completed laboratory, fleld, and joint flight testing of DOD-produced LANCE bardware leading to type classification in FY 1981. Production of LANCE warhead adaption adaption kits was completed in FY 1979. The Army provided design support for the projectile main body case allowing DOE to

Engineering Development and subcomponent packaging redesign of the fuze for the 150mm AFAP were initiated in FY 1979. Process engineering and design testing of the aft projectile body and rocket motor were conducted in FY 1979 and FY 1980. Ballistic characterization flight tests of mock 155mm muclear projectiles were conducted in FY 1979. Engineering design support was provided for the Tri-Service EDS project and Army Materiel System Analysis Agency (AMSAA) Command, Control and Security Systems (CC&S) study. Fuze safety flight tests were completed on the fuze for the improved 8-inch AFAP in FY 1980. The fuze, fuze spanner wrench, projectile extractor, and training projectile were type classified for the 8-inch AFAP in FY 1979 and FY 1980. Engineering development of the AFAP limited life component (LLC) exchange van and stand was initiated in FY 1979.

Program Element: #6.46.03.A
DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare

Title: Nuclear Munitions
Budget Activity: #4 - Tactical (rogram

Testing the structural integrity of field interchangeable projectile aft body/rocket motor joint and process engineering for rotiting band attachment to the titanium projectile body of the 155mm AFAP was done in FY 1980. Flight testing of the 155mm AFAP design for ballistic performance was continued in FY 1980. The AMSAA CCSS study was completed, and the objective of project D584 was redefined to orient on weapon access denial systems (MAD). Development Testing/Operational Testing Phase ? (DT/OT II) for the 8-inch AFAP, LLC van design, and transition to production for the 8-inch AFAP was completed in FY 1980.

- 2. FY 1981 Program: The reduction in 155mm AFAP modernization effort in FY 1981 (see D335 Project Descriptive Summary) prevents the planned procurement of hardware to support required DT/OT II testing. The revised program allows the Army to maintain continuity in the engineering development program for the radar fuze and to complete engineering lesign on the oft projectile body/rocket motor for the 155mm AFAP modernization in FY 1981. Defense Nuclear Agency will sponsor prototype access denial subsystems installation at the cheater nuclear weapon storage site for evaluation and development by the Army in the command, control, and security systems project. Department of Defense (D30) production line fuzes, rocket motors, and containers will be provided to Department of Energy (D0E) for assembly into the first production unit 8-inch nuclear projectiles. First delivery of the new 8-inch AFAP to D0D will occur in and 100 will be in the
- 3. FY 1982 Planned Program: Procure production-line quality fuzes, projectile aft body/rocket motors, containers, and fuze setters to support DT/OT II testing in FY 1983 and continue ballistic characterization flight tests for the 155mm AFAP modernization. Initiate evaluation of integrated weapon access denial subsystem at a theater storage site.
- 4. (U) FY 1983 Planned Program: Initiate DT/OT II testing and long-leadtime procurement and tooling to support production of the Improved 155mm Nuclear Projectile. Provide funds to DOE for Army reimbursable items of DOE developed equipment. Complete evaluation of access denial system.
- 5. Program to Completion: Complete DT/OT II testing, firing table flights, type classification; production, and training required to achieve initial Operational Capability (IOC) with the modernized 155mm nuclear projectile in Iterate weapon access denial system design as required and initiate military construction and other procurement as required to upgrade theater storage sites. Complete procurement of DOD-hardware to support deployment of the disproved 8-inch nuclear projectile, YM/53/W79.

II-377 A C1, 31 Mar 81

64 4

٠.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D385

Program Element: #6.46.03.A

1241 - Battlefield Theater DOD Mission Area: Nuclear Warfare

Title: Improved 155mm Nuclear Projectile
Title: Nuclear Munitions Budget Activity: #4 - Tactical Programs

A. DETAILED BACKGROUND AND DESCRIPTION: The objective of this project is the development of an improved 155mm Nuclear Projectile, the XM785 to replace the current 155mm artillery-fired atomic projectile (AFAP)

Soviet-Warsaw Pact (WP) tactical doctrine is based on massing maneuver forces to achieve a numerical superiority ratio of 10 or 12 to 1 at the decisive point in ver forces by about __their cannon artillery outnumbers NATO cannon artillery by more than ___and their maneuver forces are highly mobile with armored protection. AFAP's give NATO forces the additional battlefield fire support needed to counter the Soviet-WP force superiority. Because they are controllable and useable, NATO AFAP present a threat to Soviet-WP forces that cause them to adopt combat formations that reduce their effectiveness in executing their doctrine for the conduct of battle. Thus, the real warfighting capability of AFAP deters conventional conflict as well as it provides a nuclear capability and a link to strategic systems. However, because of

The NATO cannon artillery force structure is predominantly (80%) 155mm. The 8-inch cannon will not provide an adequate battlefield nuclear capability alone, or even when augmented with the LANCE, the modernized 8-inch AFAP, and the old 155mm AFAP. Numerous comprehensive analyses by the Army, Office of the Secretary of Defense, Department of Energy, and the Defense Science Board have all concluded that both a modernized 8-in AFAP and a modernized 155mm AFAP are essential to a credible battlefield nuclear capability that provides first deterrence and then effectiveness, should deterrence fail. Nuclear capability provided by a dual-capable cannon force is also required because it needs no change in force structure of weapons, communications equipment, and manpower spaces beyond the artillery needs for the conduct of conventional fire missions. Analysis has shown that a nuclear capability in both the 8-inch and the

11: 178

A latter

Project: #D385
Program Element: #6.46.03.A
DOD Mission Area: #241 - Battlefield Theater
Nuclear Warfare

Title: Improved 155mm Nuclear Projectile
Title: Nuclear Munitions
Budget Activity: 14 - Tactical Program.

155mm cannon enhances the overall survivability of theater nuclear forces by compounding and compile of tag the enemy effort to target NATO nuclear forces. The combined US and non-US NATO forces have only about deployable a in cannon, versus deployable 155mm cannon. Not all non-US NATO 155mm and 8-inch cannon are currently "nuclear curified", but 80% or more are "certifiable" and hence a nuclear threat to enemy forces. Some countries maintain only a token number of 8-in cannon's and others have only the 155mm cannon The 155mm AFAP project is the only nuclear modernization program that has been developed from the beginning in conjunction with and in consideration of the Allied interest. Based on this ongoing modernization, the NATO Alli shave declined to certify their new family of howitzers, the SP/FH-70, with the old 155mm AFAP. The modernized 155mm AFAP at 1 have a yield times greater than the 1950's technology could provide in the old 155mm AFAP and will provide times the lethtimes the lethal coverage. The new projectile will weigh less and be stressed for twice the launch setback forces. With rocket-assist, it will achieve approximately twice the range of the old 155mm AFAP allowing standoff from of Soviet cannon artillery. The modernized 155mm AFAP will have a fuze instead of the inherently inaccurate doppler proximity-medicule time fuze on the M454, and will produce a more precise height-of-burst and have greater assurance of not producing fallout. Firing data corrections derived from the conventional ammunition being fired will reduce the delivery probable error: by 50% or more compared to the method of calculated corrections used for the current 155mm AFAP. Finally, weapon control on the new AFAP will be provided by an electromechanical multiple-code permissive action link (PAL) instead of a mechanical lock, and security will be improved by an integral nonviolent command disablement system.

- B. (U) <u>RELATED ACTIVITIES</u>: The Department of Energy, Defense Programs (DOE-DP) will develop the nuclear warhead. A joint DOE/DOD project officers group will coordinate the integrated DOE/Army development effort. The XM785 and attempt to match the ballistic characteristics of the M549 conventional 155mm projectile. It will also employ fuze technology developed and engineered for the 8-inch projectile. England, Germany, and Italy have completed development and are now beginning production on a new 155mm howitzer, the SP/FH70, with which the new 155mm nuclear projectile will be compatible.
- C. (U) WORK PERFORMED BY: US Army Armament Research and Development Command (ARRADCOM), Dover, NJ; durry Diamond Laboratories, Adelphi, MD; Army Materiel and Mechanics Research Center, Waterrown, MA; ARRADCOM, Aberosca, MD; Department of Energy, Defense Programs facilities, Lawrence Livermore Laboratory, Livermore, CA; Sandia Laboratories, Livermore, CA; Denver, CO; Aiken, SC; Chamberlain Corporation, Waterloo, IA; Motorola Incorporated, Scottadale, AZ.

Project: #0385
Program Element: #6.46.03.A
DOD Mission Area: #7.41 - Battlefield Theater
Nuclear Warfare

Title: Improved 155mm Nuclear Projectile
Title: Nuclear Munitions
Budget Activity: #4 - Tactical Programs

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

FY 1980 and Prior <u>Accomplishments</u>: Subsequent to the Public Works Subcommittee hearings on the FY 1977 Energy Research and Development Agency (now Department of Energy-Defense Programs (DDE-DP)) Appropriation Act, DOE and Department of Defense (DOD) were directed by Congress to jointly reassess the 155mm nuclear projectile requirement in light of the approved 8-inch nuclear projectile and the LANCE Mod 3 warhead production. The "155mm Artillery Fired Atomic Projectile Modernization Analysis" report was provided to Congress in February 1977. The Army requested DOE-DP participation in a joint engineering development program for an improved 155mm projectile in May 1977 and DOD forwarded the request to DOE in October 1977. accepted the program and began engineering development (Phase 3 for DOE) in February 1978. The Secretary of Defense had directed in his FY 1979 Amended Program Decision Memorandum (APDM) that the Initial Operational Capability date for the improved 155mm nuclear projectile be accelerated

The basis for this directive was the possibility of a pre-comprehensive test ban (CTB) moratorium on testing that would stop development of the new projectile. The basis for this directive was the The Army and DOE pursued an atypical development program that resulted in an underground nuclear test in of a weaponizable muclear device for the 155mm projectile. This test assured that the Army could modernize the 155mm in the event of a CTB. It was also a proof test for design changes that produced a yield greater than All Army RDTE effort in FY 1978 was devoted to engineering design work on the projectile main body in support of the early DOE nuclear test. Design changes in the nuclear device forced a reduction in the volume available for a rocket motor. The need to develop a new rocket motor, the delay in DOE acceptance of the program, and the push for an early nuclear test caused the Army to slip the Initial Operational Capability (IOC) Full Engineering Development was initiated in FY 1979. Electronic packaging of fuze functions, test firing of high energy rocket propellants, ballistic characterization analyses, thereface iteration with NOE, and metallurgical manufacturing processes were all emphasized. The developer's acquisition plan was formalized and reviewed by the Army Staff in late FY 1979. Ballistic characterization flight tests and structural integrity flight testing of DOB components were conducted. The design of the field joint between the DOB weapon in the projectile main body and the projectile aft body that provides for interchangeability of the range-extending rocket motor was finalized. Process engineering for the attachment of high-pressure obturating bands/rotating bands to the titanium aft projectile body/rocket motor was developed in an Army laboratory and transferred to the Chamberlin Corporation. Conducted funcflight tests of prototype fuzes. Established the ballistic validity of ballistic verification projectiles and further characterized the ballistic performance of the XM785. After a DOD reduction in the FY 1981 program (10 relieve mid-1980's demands on the Department of Energy (DDE) nuclear weapon production complex), the FY 1980 program was intentionally slowed to level the effort through FY 1980 and FY 1981, and to minimize the impact of the reduction on out-of-house contractors.

11 380

. 101125

Project: #D385
Program Element: #6.46.03.A
D00 Mission Area: #241 - Battlefield Theater
Nuclear Warfare

Title: Improved 155mm Nuclear Projectile
Title: Nuclear Munitions
Budget Activity: 14 - Tactical Programs

2. (U) FY 1981 Program: Sustain the contractor (Motorola) fuze production line to preserve the validity of FY 1980 fuze testing data for use in conjunction with Development Testing/Operational Testing, Phase 2 (DT/OT II). Complete validation testing of titanium aft body process engineering. Conduct Special In-Process Review to update Acquisition Plan and a design review and acceptance of the DOE Preliminary Weapon Development Report.

- 3. (U) FY 1982 Planned Program: Initiate production of production-line quality fuzes, projectile art/bodies/renket motors, containers and fuze setters for DT/OT il testing. Continue ballistic characterization flight tests.
- 4. (U) FY 1983 Planned Program: Initiate DT/OT II testing. Initiate long-leadtime procurement and tooling to support quantity production.
- 5. <u>Program to Completion:</u> Complete development and DT/OT II testing, firing table flights, the classification, and production of the XM785 nuclear projectile with XM749 fuze and all ancillary and support equipment. Complete new material training and achieve initial operational capability (EOC) with an Improved 155mm Nuclear Projectile in 4QF785.
 - 6. Major Milestones:

11-381 C1, 31 Har 81

Project: 10385
Program Element: 16.46.03.A
DOD Mission Area: 1241 - Battlefield Theater
Nuclear Warfare

Title: Improved 155mm Muclear Projectile
Title: Nuclear Munitions
Budget Activity: 14 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1980 Submission
Army requested joint Department of Defense-Department of Energy (DOD-DOE) Engineering		
Development of new 155mm		
Nuclear Projectile	Itay 1977	May 1977
OSD forwarded request to DOE	Oct 1977	Oct 1977
DOE accepted request (Initiated		
Phase 3)	Feb 1978	Feb 1978
DOE underground nuclear test proves technology		
In-Process Review (IPR) to		
approve Acquisition Plan	Mar 1979	Mar 1979
DOE underground nuclear test proves weaponization Begin development testing/		
operational testing (DT/OT		
1[)	January 1983*	4QFY1982
Development Acceptance (DEVA) IPR (DOD components only)		49FY1983
	May 1985*	4QFY1984
	20FY1985*	10FY1985
(DOD & DOE components) First War Reserve Hardware Available for DOD Initial Operational Capability (JOC)	20(61170)*	rye (170)

11-382 Cl, 31 Mar 81

La la Salada de Company

Project: #D385
Program Element: #6.46.03.A
D09 Mission Area: #241 - Battlefield Theater
Nuclear Warfare

Title: Improved 155mm Nuclear Projectite
Title: Nuclear Munitions Budget Activity: 14 - Tactical Programs

Because of the urgent need for the 155mm nuclear projectile modernization, slippage in the current milestone dates from the dates shown in the FY 1981 submission resulted from refinements to development scheduling by both 1990 and 1906 in further adjustment to the FY 1981 decrement. No slippage of the 1906 due to 1900 development program is anticipated. The predicted capacity of the DOE production complex and the could force IOC deliys in the future. Asterisked (*) milestone dates depend on the thousand in the FY82 Budget amendment.

Resources (\$ in thousands):

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE						
Funds (current requirements) Funds (as shown in FY 1981	18998	9351				
submission)	21267	10049				
Quantities (current requirements)	*	*				
Quantities (as shown in FY 1981 submission)	*	*				

^{*} Total in FY 1982 is FY 1982 Budget Amendment to restore funds deferred by the preceding administration.

 $\operatorname{su}_{i}(\mathbb{R}^{n}) = \mathbb{R}^{n \times n \times n}$

The \$2269 thousand decrease in FY 1980 is the result of reprograming unexpended funds made available by the leveling of effort in FY 1980 and FY 1981 after the sharp reduction in the FY 1981 program (see explanation, paragraph DI). At least \$1999 thousand of this amount is anticipated to be reprogramed back in the future. The \$696 thousand decrease in FY 1981 reflects the application of general Congressional reductions. The \$1140 thousand decrease in FY 1982 is due to a \$961 thousand decrease due to refinements in the program that followed the FY 1981 reduction (see explanation, paragraph B1) and a thousand decrease that occurred when the thousand deferred from the FY 1982 budget was "rounted-off" to thousand in the FY 1982 amendment.

11-383 C1, 31 Mar 81

Project: #0385

Program Element: #6.46.03.A DOD Mission Area: #241 - Battlefield Theater Nuclear Warfare

Title: Improved 155mm Nuclear Projectile
Title: Nuclear Munitions
Budget Activity: 14 - Tactical Programs

Other Appropriations:**	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Fotal Estimated Cost
Procurement Ammunition, Army						
Funds (current requirements)	0	0				
Funds (as shown in FY 1981						
submission)	0	0				
Quantitles (current regulrements)	0	0				
Quantities (as shown in FY 1981						
submission)	0	0				

*Warhead quantities and production rates exceed the classification of this submission. Overall quantity clanged from FY 1981 to FY 1982 (see below).

**Department of Defense-procured components only; Department of Energy-Defense Programs (DOE-DP) budget figures exceed classification of this document.

The \$6100 thousand increase in procurement cost from FY80 to FY81 is due to \$52100 thousand increase due to Inflation to FY 1980 constant dollars and Base Line Cost Estimate increases offset by a \$46000 reduction due to a 55% stockpile quantity decrease in accordance with the FY 1982 Amended Program Decision Memorandum. The FY 1981 Base Line Cost Estimate increases were due to 30% and greater increases in electronic costs, the addition of titanium for rocket motor bodies, the addition of prescribed and lear load trainers, the addition of limited-life component vans, and the addition of alternate fuggraetter power supplies.

11 184

relation of

HINCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.08,A
DOD Mission Area: #211 - Close Combat

Title: Army Small Arms Program
Budget Activity: 14 - Tactical Program

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

							Total
Project		FY 1980	FY 1981	FY 1982	FY 1983	Additional	Est1 ia.tıl
Number	Title	Actual	Estimate	Estimate	Estimate	To Completion	Costs
	TOTAL FOR PROGRAM ELEMENT	1446	0	400	400	Continuing	Not App Cable
DF 21A	NATO Small Arms Evaluation	1446	0	400	400	Continuing	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The NATO Small Arms Evaluation was completed in FY80 and has resulted in a NATO standardization Agreement (STANAC) that is undergoing ratification by member countries. The standardization effort described below represents a new start in FY82 under this program element. The product of this enfort is the development, maintenance, and assurance of complete interchangeability of small caliber and automatic standardization and weapons among all NATO countries with all of the logistic, strategic, and tactical advantages associated therewith. This is achieved by developing, implementing, and maintaining NATO standardization agreements (STANAC's) and by periodic inspection of compliance thru structured batteries of standardized interchangeability tests at specially equipped and calibrated Test Centers (chartered by NATO and operated under NATO aegis), one of which is the North Americ in Regional Test Center (NARTC) located at US Army ARRADCOM, Pt Dix, NJ. Included in this program is the development of these standard test procedures and test equipment and their codification into standard NATO Manuals of Proof and Inspection Procedures, as well as the staffing and operation of the NARTC. The program includes all studies, experimental work, and analyses required to generate and support US positions and to fulfill commitments made to NATO. The program covers the entire range of weapon systems up to and including 40mm, and is currently active in 5.56mm, 7.62mm, 9mm, 20mm x 139, and 25mm ammunition and includes all ancillary frems such as links, clips, chargers, and magazines. The addition of 35mm-40mm ammunition is anticipated in consequence of the DIVADS program.
- C. (U) BASIS FOR FY 1982 ROTE REQUEST: These funds are to support US participation in the work of the NATO Panel (AC/225 Panel III, Sub-Panel I) responsible for NATO small caliber ammunition; the implementation of NATO agreements into the US production base; the staffing, maintenance, and operation of the NARTC; and all necessary engineering and laboratory support required during FY 1982. This program has been operational for 20 years and supported from procurement appropriations, a method now deemed unsuitable for supporting this continuing program. Milestones are not applicable to this program.
- D. (U) COMPARISON WITH FY 1981 ROTE REQUEST: (\$ in thousands) Not Applicable. There was no FY81 submission.
- E. (U) OTHER APPROPRIATION FUNDS: Not Applicable.

UNCLASSIFIED

Program Element: #6.46.08.A DOD Mission Area: #211 - Close Combat UNCLASSIFIED Title: Army Small Arms Program
Budget Activity: 14 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: The objectives of the program are the participation in multilateral efforts to achieve complete battlefield interchangeability of all small caliber and automatic-cannon caliber amount for produced in all NATO countries in all of the weapons produced by or used in those countries; to implement resultant standardization agreements into US production; to participate in the design and operation of a mechanism for guaranteeing and scientaling compliance with NATO standization agreements by the US. The program has the following discrete elements:

a.(a) To purticipate in the development of the technical content of all NATO standardization agreements (ST/NA:).

b.(e) To foster, advocate, and recommend use by the NATO Panel and incorporation into applicable STANAC's to the fullest extent possible, designs, processes, requirements, procedures, and equipment of the US so that compliance of the terms and conditions of the STANAC can be achieved by the US at minimum cost and with the least possible disruption of well-established procedures and processes.

call To reconcile differences, when they exist, between US national interests and those of NATO; to obtain through suitable negotiation, a congruence of these interests and to achieve the goals and objectives of the NATO panel with the least possible compromise of or modification to US national interests, policies, programs, and procedures. To provide technical guidance to national design, production, or procurement agencies early enough to prevent embarkation on a course which ultimately will prove detrimental to US interests or deleterious to the goal of battlefield interchangeability.

d.(a) To monitor the output of the US design, procurement, production, or using agencies to obtain timely indication of difficulties or hardships for which relief should be sought through modification of some aspect of the agreements in the STANAG; to prepare an effective technical position (often requiring testing or other experimental work) to petition for such relief and to endeavor to obtain that relief without endangering or diminishing the ultimate accomplishment of the NATO papel.

e 40) To prepare and publish the English language version of the NATO Manuals of Proof and Inspection Procedures and amendments and revisions thereto, as a service to the NATO panel.

f $^{(d)}$ To manage the interfaces between NATO and the US authorities in areas of ammunition standardization.

give To staff, equip, maintain, and operate the North American Regional Test Center (NATC), which serves as an extra-national test agency to conduct, as a service to NATO, official NATO qualification-approval, production and surveil-lance testing of ammunition and ancillary items produced in NATO countries, and other engineering-type tests directed by NATO. Such other tests include tests to qualify new weapon designs for use in ammunition tests, tests to design and approve new test equipment and methods for adoption by NATO, tests to establish international standards for reference rounds, piezo-electric pressure transducers, and test barrels.

UNCLASSIFIED

11 - 186

k Markeya

..

Program Element: 46.46.08.A

DOD Mission Area: 4211 - Close Combat

Title: Army Small Arms Program

Budget Activity: #4 - Tactical Programs

h.(w) To participate in the affairs of the NATO panel through active attendance at plenary sessions and meetings of the executive committee and North American Regional Panel and all ad hoc committees and working groups established by the Chairman for the accomplishment of a specific job or consideration of a particular problem.

- G. (U) RELATED ACTIVITIES: The program embodies the total US effort in achieving NATO interchange ability of small caliber and automatic cannon caliber infantry weapon—systems. This program contains no duplication of effort either within the Army or DOD and meets the relevant mission requirements of all services.
- H. (U) WORK PERFORMED BY: RDTE work associated with this program is conducted in-house at the US Acmy ARRADCOM facilities located at Dover and Fort Dix, NJ. No contractors are associated with this program except for small procurements of test equipment and material.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Prior efforts under this program element were the funding of the NATO Small Arms Evaluation through FY 1980. That program has been completed and has resulted in the selection of a second NATO standard caliber (5.56mm) for small arms and the production of a NATO Standardization Agreement (STANAG) which is undergoing ratification by member countries. The described effoir is a new program under this program element. The prior program was generally funded from the procurement allocations under which ammunition standardization programs were developed and implemented for 7.62mm, 9mm, 20mm x 139 and for 7.62mm links, clips, and chargers. A STANAG for 5.56mm ammunition has been initiated, and a STANAG for 25mm ammunition is in process. The North American Regional Test Center (NARTC) has been fully staffed and equipped and has been operational for 19 years. It actively maintains colibration and correlation with its European counterpart and ten National Test Centers. As a result of these efforts, the armies of the NATO countries are equipped with rifles, machine guns, sidearms and automatic cannon which will fire any ammunition produced in any of the NATO countries. As a result of the mechanisms established in these prior years, the interchangeable stockpile of NATO ammunition is still growing, in some cases, 20 years after ratification of the STANAG, and the introduction of noninterchangeable ammunition production whose interchangeablity is guaranteed by this work. As an example, since the ratification of STANAG 210 (7.62mm ammunition), the US has produced approximately 6500 lots containing nearly 10 billion rounds of the follow-on ammunition worth some \$750 million and approximately 2 million 7.62mm weapons worth \$500 million. The total NATO 7.62mm ammunition worth some \$750 million and approximately 2 million 7.62mm weapons worth \$500 million. The total NATO Furthermore, the confidence with which the interchangeablity—established by this program is held allows for the acquisit

UNCLASSIFIED

Program Element: #6.46.08.A DOD Mission Area: #211 - Close Combat Title: Army Small Arms Program

Budget Activity: 44 - Tactical Programs

- 2. (U) FY 1981 Program: FY 1981 is the transition year from prior funding sources to RDTE. Whereas an FY 1981 proposal was not submitted in time to be included in the budget, a below threshhold reprogramming action is expected to provide sufficient funds in FY 1981. These funds will be used to continue all of the ongoing efforts including operation of the North American Regional Test Center (NARTC), and to complete the development of the standardization program for 5.56mm amount from
- 3. (U) FY 1982 Planned Program: The FY 1982 program will primarily support the completion of the 25mm standardization program, the design, acquisition, and/or fabrication of 5.56mm-peculiar test equipment and gauges, the publication of the 5.56mm Manual of Proof and Inspection Procedures, and initiation of full-scale efforts on standardization of 5.56mm link, cities, and chargers. The FY 1982 program will also continue the operation of the NARTC and will probably support the first interchangeability firings of 5.56mm ammunition and the first US attempts at 9mm ammunition production.
- 4. (U) FY 1983 Planned Program: The FY 1983 program will support the continuation of all ongoing programs and operation of the NARTC, and will complete the design, acquisition, and/or fabrication of 25mm-peculiar test equipment and gauges, the publication of the 25mm Manual of Proof and Inspection Procedures, and completion of work on the STANAG's for 5.56mm ancillary equipment.
- 5. (U) Program to Completion: This is a continuing program that will extend as long as the interchangeability of weapons and ammunition within the NATO community is US policy. In the outyears existing programs will be continued and new ones added as the NATO standardization of additional calibers becomes a desired objective.

UNCLASSIFIED

11-388

....

••

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.09.A DOD Mission Area: #215 - Land Combat Support Title: Combat Support Systems

Budget Activity: 14 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 1297	FY 1981 Estimate 548	FY 1982 Estimate 3102	FY 1983 Estimate 2701	Additional to Completion Continuing	Total Estimated Cost Not Applicable	
D191	Smoke Munitions and Material System	1297	548	3102	2791	Continuing	Not Applicable	

- B. (U) BRILL DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the Engineering Development (ED) of new and improved smoke munitions and systems. Adequate tactical protection of armored vehicles requires that they possess the means to rapidly and effectively obscure the enemy's surveillance and thus interfere with his weapons acquisition, aiming, and guidance capabilities. Armored vehicle on-board smoke screening systems being developed will provide rapid response protection systems that meet this requirement.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Funds are required to complete development of the rapid smoke grenade launcher for tactical vehicles such as self-propelled artillery, self-propelled air defense systems, and combat support vehicles, to complete validation and adaptation studies of the vehicle engine exhaust smoke system (VEESS) to the Mod., M60A2, and M48A5 tanks, Armored Vehicle Launch Bridge (AVLB), H728 Combat Engineering Vehicle (CEV), and M88A1 Medium Recovery Vehicle (MRV), and to continue development of VEESS for armored vehicle engines such as self-propelled artillery and air defense systems.
- D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	1297	548	3102	Continuin,	Not Applicable

UNCLASSIFIED

Program Element: #6.45.09.A
DOD Hission Area: #15 - Land Combat Support

Title: Combat Support Systems

Budget Activity: 4 - Tactical Programs

Total Additional Estimated PY 1980 FY 1981 FY 1982 Cost To Completion 1028 620 3528 Not Applicable Funds (as shown in FY 1981 Continuing submission)

The \$169 thousand dollar increase in FY 1980 was required to complete type classification of the XM257 grecole launcher. The decrease of \$72 thousand in the FY 1981 funding level reflects the application of general Congressional reductions. The \$426 thousand decrease in FY 1982 is the result of not receiving projected requirements for developing grounde launcher systems for self-propelled air defense weapons and artillery.

E. (II) OTHER APPROPR'ATION FUNDS: (\$ in thousands): Not Applicable.

UNCLASSIFIED

Program Element: #5.46.09.A DOD Mission Area: #215 - Land Combat Support Title: Combat Support Systems
Budget Activity: #4 - Tactical Programs

- F. (D) DETAILED BACKGROUND AND DESCRIPTION: This program supports the development of rapid smoke protection for US armored vehicles to include the following: application of the M239 or M250 rapid smoke grande launcher to M60A2, XM1, and M48A5 tanks, M72B Combat Engineer Vehicle, DIVAD Gun, and M88A1 Medium Recovery Vehicle, development of a 4-tube discharger, grande launcher system for application to the Infantry Combat Vehicle, Improved TOM Vehicle, SLUFFAE, M113 Squad and TOM Carrier, and other combat vehicles. Additionally, a vehicle engine exhaust smoke system (VEESS) for 100A1/A3 tanks and other US diesel-driven armored vehicles is being developed which with complement the rapid smoke grander launcher system.
- G. (U) <u>RELATED ACTIVITIES</u>: The Army is the Department of Defense (DOD) Executive Agent for development of smoke and unitispectral obscurants. The other Services sponsor engineering development for material unique to each service. Litison personnel from each Service monitor the developing agencies programs, and joint committees meet regularly to review Service needs and insure development programs are oriented to satisfy joint needs. This program is supported by Program Elements 6.26.22.A, Chemical Munitions and Chemical Combat Support, and 6.36.27.A, Combat Support Munitions.
- B. (U) MORK PERFORMED BY: The Smoke Systems program is managed by the Project Manager-Smoke/Obscurints. Approximately 60 percent of the armored vehicle rapid smoke protection systems effort will be in-house by US Army Chemical Systems Laboratory, Edgewood, MD; 20 percent will be the test effort of the US Army Test and Evaluation Command, Aberdeen Proving Ground, MD; and 20 percent will be contractor effort. Fifty percent of the vehicle exhaust smoke generating system will be in-house by the US Army Chemical Systems Laboratory, Edgewood, MD, and 50 percent will be contractual effort with Teledyne Continental Motors Corporation, Muskegon, MI. Other efforts supporting this program will be conducted by US Army Test and Evaluation Command, Aberdeen, MD; Miller Research Corporation, Baltimore, MD; Battelle Corporation, Columbus, OH; Project Manager-MG0; Project Officer-MB8; Project Manager-XM1; Project Manager-Fighting Vehicle Systems (FVS), Project Manager-Improved TOM Vehicles; Project Manager M113A1 Armored Personnel Carrier; Chrysler Corporation Defense Division, Warren, MI; and US Army Armament Materiel Ress Income Sommand, Rock Island, IL.

I. (U) PROGRAM ACCOMPLISHMENTS AND PUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: Concept feasibility testing, user testing, and type classification of the M239 launcher (6-tube) and L8A1 Smoke Grenade for M60A1/A3 Tanks were completed in FY76 along with the initiation of design for a 4-tube launcher for other types of armored vehicles. During FY 1978, the US Tank Units in Europe received approximately 600 of the recently type classified M239 rapid smoke grenade launcher systems. The initial fielding plan, which called for issuing 1291 M239 systems to US Army forces in Europe for application to M60A1 tanks, was completed in December 1978. In FY 1979, type classification of the M243 and M250 rapid smoke grenade launchers was completed. A value engineering program to redesign the M239 launcher dischargers to reduce the weight, develop interchangeable bases, and lower the

UNCLASSIFIED

Program Element: #6.46.03.A DDD Mission Area: #215 - Land Combat Support Title: Combat Support Systems
Budget Activity: #4 - Tactical Programs

cost was initiated. Coordination with Project Manager-M60 was initiated for fielding of the vehicle engine choust smoke system (VEESS) on M60A1/A3 tanks. Validation and adaption programs of the VEESS to the M60, M60A2, M48A5 tanks, AVLB, M728 CEV, and M88A1 Medium Recovery Vehicle (MRV) were initiated. and artillery. In FY 1980 the M257 snoke grenale launcher designed for use on the Infantry Fighting Vehicle (IFV) was type classified. Effort continued on develop ment of the XM259 grenale launcher and adaptation for follow-on armored vehicle requirements, and the validation and adaptation of udies of the VEESS to the M60, M60A2 and M48A5 tanks, AVLB, M728 CEV and M88A1 MRV. A feasibility study of a VEESS for the letroit Diesel 6V53 engine was initiated.

- 2. (U) FY 1981 Program: Development efforts will continue on the XM259 grenade launcher for the MilAl amored Personnel Carrier, Surface Launch Unit Fuel Air Explosive (SLUFAE), and the Marine Corps LVT-7 vehicles. Wore citl also continue on validation and adaptation studies of the VEESS to the M60, M60A2, and M40A5 tanks, Armored Vehicle Gaunch Bridge (AVLB), M728 GEV, and M80A1 MRV. Developmental work on an engine smoke generator for the XM1 tank and Infant y Fighting Vehicle/Cavalry Fighting Vehicle will be monitored by PM Smoke. System-specific work will be accomplished by each system's respective project manager office.
- 3. (U) FY 1982 Planned Program: Development and adaption of rapid smoke grenade launcher systems for the M113A1 SLUFAE and the LVT Vehicles will be completed. The feasibility study of a VEESS for the 6V53 Detroit diesel engine will also be completed. Fielding programs of the vehicle engine exhaust smoke system (VEESS) will be coordinated with PM-M60 for the M60, M60A2, and M48A5 Tanks, Armored Vehicle Launch Bridge (AVLB), and M728 Combat Engineer Vehicle (CEV). Engineering Development will be initiated on a manportable smoke/obscurants generating system. The Development Test II/Operational Test If plan will be prepared. Procurement of test Items will be initiated.
- 4. (U) FY 1983 Planned Program: Engineering Development effort on launcher adaptation for additional identified armor vehicle requirements will continue. Development will be initiated on a vehicle engine exhaust smoke system (VEESS) for the 6V53 Detroit diesel engine and other tracked vehicle engines as required. The DT II/OT II tests of the manportable obscurants generating system will be completed and evaluated. Production prototypes will be selected. Plans for DT II/OT II on the XM76 infrared defeating smoke grenade will be prepared.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

dation,

F1- 392

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.10.A DOD Mission Area: #215 - Land Combat Support Title: Lethal Chemical Munitions
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1979 <u>Actual</u> 1050	FY 1980 Estimate	FY 1981 Estimate 2219	FY 1982 Estimate 1583	Additional to Completion Continuing	Total Estimated Cost Not Applicable
DF94	Lethal Chemical Ground Munitions	1050	0	2219	1583	Continuing	Not Applicable
DF95	Lethal Chemical Missile Warhead	0	0	0	0	Continute.	Not Applicable

- 8. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Soviet Union has developed and continue to maintain a formidable offensive chemical warfare capability which presents a threat to the survival of United states (US) and North Atlantic Treaty Organization (NATO) forces. In contrast, the US has not manufactured any chemical actions since 1969. Consequently, the current stockpile is deteriorating and becoming obsolete. National defense police aquites the development and maintenance of a credible deterrent/retaliatory chemical warfare capability. This diagram Element supports that requirement by providing for the Engineering Development of agent/munition protocypes completing Advanced Development. Work accomplished under this program supports all Engineering Development needs of the Army, and the account forces of the Marine Corps for the development of a chemical capability for artillery, rocket, and tactical mission warheads.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Engineering Development (ED) will be initiated on a lethal binary Intermediate Volatility Agent (IVA) 155mm projectile. The enhanced inhalation and percutaneous effects of the I A will significantly increase casualty production in the target area. The longer persistency of the IVA will also reduce the number of munitions required to maintain contamination in a given area for a specified time. Funds are not programed for work in Project 6.46.10 DF95, Lethal Chemical Missile Warheads, until FY 1984 when a chemical warhead for the Multiple Launch Rocket System (MLRS) is scheduled to transition from Advanced to Engineering Development.

UNCLASSIFIED

Program Element: #6.46.10.A DOD Mission Area: #915 - Land Combat Support

Title: Lethal Chemical Munitions
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown In FY 1981 Submission			
Initiate Engineering Ocyclopment (ED) on 155MM Binary Intermediate Volatility Agent Projectile	IQ FY 1982	Not Shown in FY 1981 Submission			
Complete ED on 155mm IVA Projectile	4Q FY 1984	Not Shown in FY 1981 Submission			
Initiate ED on Chemical Warhead for MLRS	1Q FY 1984	Not Shown in FY 1981 Submission			
Complete ED on Chemical Warhead for MLRS	4Q FY 1987	Not Shown in FY 1981 Submission			

The scheduled milestone and programed funding for this Program Element are extremely sensitive to changes in national policy in regard to chemical parfare and Congressional and Presidential support for construction and operation of a binary production facility. Acquisition and maintenance of a credible deterrent/retallatory capability requires consistent support.

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (Current Requirements)	1050	0	2219	Continuing	Not Applicable
Funda (as shown in FY 1981 submission)	(CDS not S				

UNCLASSIFIED

11-394

 $t = \{ t \leq t : t \in \mathcal{T} \mid t \in \mathcal{T} \}$

Program Element: 16.46.10.4 DOD Mission Area: 1215 - Land Combat Support Title: Lethal Chemical Munitions
Budget Activity: 14 - Tactical Programs

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

UNCLASSIFIED

Program Element: #6.46.1).A

DOD Mission Area: #215 - Land Combat Support

Title: Lethal Chemical Munitions
Budget Activity: 14 - Tactical Programs

- F. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: The objective of the Program Element is to apply the inherent safety characteristics of the binary concept to Engineering Development of lethal chemical artillery munitions and warheads for rockets and missiles which successfully complete Advanced Development. The program is essential to the development of a credible deterrent/retaliatory capability required by national security policy and to counter the formidable threat posed by the Soviet Union. Development of both artillery munitions and rocket and missile warheads is required to provide a capability to engage targets in both the forward and rear areas of the battlefield. Such a capability will increase the deterrent/retaliatory value of our chemical stockpile.
- G. (U) RELATED ACTIVITIES: Department of Defense (DOD) Directive 5160.5 assigns the Army executive agent responsibilities for the development of all lethal chemical agents and munitions from Basic Research (6.1) through Advanced Development (6.3), and for Engineering Development (6.4) for common use munitions. Each Service sponsors Engineering Development on lethal chemical agent weapons unique to its own specific requirements. Information is exchanged and efforts coordinated through exchange of technical documents, liaison officers, and joint technical coordinating groups which meet on a regular basis. This Program Element (PE) is supported by technology developed in PE 6.26.22.A, Chemical Munitions and Chemical Combat Support, and PE 6.36.15.A, Lethal Chemical Munitions Concepts, Project 6.36.15.DE76, Lethal Chemical Materiel.
- H. (U) WORK PERFORMED BY: The US Army Chemical Systems Laboratory at Edgewood, MD, is the in-house developer for lethal chemical agent munitions. The US Army Test and Evaluation Command (TECOM), at Aberdeen Proving Ground, MD, and Dugway Proving Ground, Dugway, UT, provide test and evaluation support.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: The M687 binary nonpersistent lethal chemical nerve agent projectile completed Engineering Development (ED) and was type classified in FY 1976. Development has continued on the XM736 binary persistent lethal nerve agent 8-inch projectile from FY 1977 to the present. Type classification for the XM736 was initially scheduled for FY 1979. Technical problems have required a delay in type classification to 4th quarter FY 1981. Funds to continue the ED efforts in FY 1980 have been provided by Army reprograming, and it is planned to reprogram funds in FY 1981 to continue the work. Because there have been no funds programed for this PE since FY 1979, a Congressional bescriptive Summary (CDS) was not submitted in FY 1980 and FY 1981. The programed funding in FY 1982 and beyond reflects the increased urgency to modernize our deteriorating chemical weapons stockpile and develop a credible deterrent/retallatory capability. During FY 1980 Development Test II/Operational Test II (DT II/OT II) was resumed on the XM736. The testing was scheduled to be completed in the lst Quarter of FY 1981.

UNCLASSIFIED

11 - 396

.

Program Element: #6.46.10.A DOD Mission Area: #215 - Land Combat Support Title: Lethal Chemical Munitions
Budget Activity: 14 - Tactical Programs

- 2. (U) FY 1981 Program: The DT II/OT II testing of the XM736 binary projectile was temporarily suspended in November 1980 while deficiencies observed during dynamic firing using agent stimulants are investigated and evaluated. A decision to resume testing or initiate additional engineering design work is scheduled to be made before the end of 2nd Quarter FY 1981. The \$594 thousand required to support the efforts will be provided by reprograming by the Army. Unless time-consuming redesign work is required, completion of ED and type classification is scheduled for 4th Quarter FY 1981.
- 3. (U) FY 1982 Planned Program: It is planned to initiate ED on the 155mm binary intermediate volutility agent (1VA) projectile. Manufacture of munition components will be initiated, and the DT II/OT II test plan will be completed.
- 4. (U) FY 1983 Planned Program: Engineering Development of the 155mm binary IVA projectile will outline with the initiation of DT II/OT II.
- 5. (U) Program to Completion: Engineering Development will be completed on the 155mm projectile in FY 1984 and initiated on chemical warheads for the Multiple Launch Rocket System (MIRS) and the Corps Support Weapon System (CSWS). Work will continue on the MIRS and CSWS chemical warheads through FY 1987. The PE will continue to support E9 on new munition requirements identified by the user community.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.12.A

DOD Mission Area: #214 - Hine Warfare

Title: Countermine and Barriers
Budget Activity: #4 - Tactical Programs

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

Project Number	Title	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Totil Estimated Cost
	TOTAL FOR PROGRAM ELEMENT	3608	1786	3031	5272	Continuing	Not Applicable
	QUANTITIES					_	Not Applicable
DO21	Explosive Demolitions	600	203	211	1458	Continuing	Not Applicable
D145	Surface-Launched Unit, Fuel-						
	Air Explosive (SLUFAE)	1969	351	0	0	0	26113
D300	Countermine and Barrier (NATO)) 0	538	0	υ	0	5 :8
D415	Mine Neutralization/						
	Detection	1039	694	2820	3814	Continuing	Not Applicable

The total estimated cost of project number D145 as reported in FY81 Congressional Descriptive Summary was understated due to administrative oversight. The project total under this PE did not include R&D totals accruing during the FY71-FY77 time period while included in PE 6.36.19A, Landmine Warfare and Barrier Development, Project D606, Landmine Warfare Development and PE 6.46.12A, Countermine and Barriers, Project D415, Mine Neutralization/Detection. The current total estimated cost represents actual total R&D costs based on government records through FY80 and those additional known remaining R&D costs in FY81.

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This PE provides for the development of explosives and devices for general tractical demolitions missions, special-purpose items for general Army and Special Forces use, equipment for US Army Technical Escort, Army-peculiar to is and kits for Explosive Ordnance Disposal (EOD) units and engineering development of a group of complementary mine detection and neutralization systems. Demolitions are used to assist in the rapid creation of obstacles to enemy movement and to aid friendly mobility by clearing enemy obstacles and debris. Technical escort provides for the safe movement of potentially hazardous munitions. EOD units provide a capability to neutralize inherent explosive ordnance hazards which present a possible threat to operations, installations, personnel, or material. Historically, minefields have proven to be effective combat multipliers used primarily in the defense. Defensive minefields are selected to take advantage of natural obstacles and to stop or canalize attacking forces. Mines are also used offensively for flank protection of advancing formations to deny access to vital terrain and routes of communications. The Warsaw Pact, whose

UNCLASSIFIED

1. 1. 15 55 4

Program Element: 16.46.12.A DOD Mission Area: 1214 - Mine Warfare Title: Countermine and Barriers
Budget Activity: 4 - Tactical Programs

doctrine specifies the use of minefields during both offense and defense operations, can emplace who fields rapidly by mechanical means. The current capability to counter this mining threat by US Forces is extremely deficient in that it consists of handheld detectors which require a slow point-to-point search and then manual or explosive neutralization of individual mines. Priority is placed on development of detection/neutralization devices and systems which allow friendly forces to maintain the momentum of the attack by rapidly breaching enemy minefields and neutralizing their barrier potential. Project D300, Countermine and Barriers (NATO), has been deleted from this PE as a separate project and in the future will be included as a task under project D415.

C. (U) BASIS FOR FY 1982 RDTE REQUEST: Initiate engineering development (RD) on the Bridge Destruction Device, a manportable line charge mine neutralization system (POMINS), a vehicle magnetic signature duplicator system (VEMASID), redesign the fuzing mechanism of the British mine-clearing line charge (Giant Viper), and continue ED on the vehicle-mounted road mine detector.

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

	FY 1980	PY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RUTE Funds (current requirements)	3608	1786	3031	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	3671	1876	5788	Continuing	Not Applicable

The small decrease in FY80 reflects reprograming to higher priority Army requirements. The FY81 decrease is the result of general Congressional reductions and reprograming to higher priority Army requirements. The decrease is the FY82 program reflects a delay in the initiation of work on some DO21 tasks and program delays associated with advanced development efforts on the Israeli Portable Mine Neutralization System (POMINS) and the Vehicle Magnetic Signature Duplicator (VEMASID) p415.

UNCLASSIFIED

Program Bloment: #6.46.12-A

DOD Mission Area: #214 - Mine Warfare

Title: Countermine and Barriers
Budget Activity: #4 - Tactical Programs

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	PY 1983 Estimate	Additional To Complection	Total Estimated Cosi
Ammunition Procurement, Army						
(Blasting Agent)						
Funds (current requirements)	0	2500	0	0	0	2500
Funds (as shown in FY 1981						
submission)	0	2500	2700	Not Shown	8900	14100
Quantities (current requirements)	0	1650	0	0	0	1650
Quantities (as shown in FY 1981						
submission) (1000 / kits)	0	1650	2000	Not Shown	2000	5650
Ammunition Procurement, Army (SLUPAE)						
Funds (current requirement	0	0	0	0	0	o
Funds (as shown to FY 1981	ŭ	•	v	v	U	''
submission)	1	2	8700	0	144900	153600
	-	-	9700	•	1.4700	1.3 10.40
Quantities (current requirements)	0	0	0	0	0	0
Quantities (as shown in PY81			·	Ū	•	· ·
submission) (rounds each)	0	0	1250	Not shown	36996	18246
Reapons and Tracked Combat Vehicles (SLUFAE)		•			2077-	70240
Funds (current requirements)	0	0	0	0	0	
Funds (as shown in FY81 submission) (launcher mod	•	Ū	Ū	v	U	
of M548 and loader mod of	_	_				
transporter)	0	0	8000 ~	Not Shown.	32500	40500

UNCLASSIFIED

11-400

A THE LAND

Program Element: 16.46.12.A

DOD Mission Area: 1214 - Mine Warfare

Title: Countermine and Barriers
Budget Activity: 14 - Tactical Programs

	FY 1980 Actual	PY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Quantities (current requirements)	0	Ú	0	0	0	0
Quantities (as shown in FY81 submission) (launchers)	0	o	53	Not shown	0	275

The entire SLUPAE procurement schedule has changed as a result of system test failures during OT II and consequent Army decision to delete the system from the funded level in the 82 POM. Since then, however, the system successfully completed OT IIA and is scheduled for type classification in IQFY81. Funding of the procurement of Blasting Agent (BA) in FY83 and beyond is deleted due to changes in the Army priority for and the extent of the requirement for the system.

UNCLASSIFIED

Program Element: #6.46.12.A DOD Mission Area: #214 - Mine Warfare

Title: Countermine and Barriers
Budget Activity: #4 - Tactical Programs

- (U) DETAILED BACKGROUND AND DESCRIPTION: This program provides development support for several mine warrare functions In the area of tactical demolitions, simple firing devices for explosives are developed with the goal of Increased reliability and a reduction in size and weight, and a long-range remote control firing device will soon begin development. Special purpose explosives are also developed such as the Bridge Destruction Device designed to be effective against steel bridge members. Items have been developed to assist Explosive Ordnance Disposal (EOD) personnel in the neutralization of hazardous munitions, and Hard Overpack, a container for moving leaking chemical munitions, has been developed. This requirement is continuous because of the introduction of new items into the inventory and the requisition of foreign Items from both friendly and enemy sources for evaluation and potential adaption. Since the development of joint-Service EOD Items has been assumed by the Navy, this program supports Army-peculiar developments and integration of Navy-developed items into the Army system. Providing effective countermeasures to landmines continues to present a significant challenge to the Army developer. In recent years, efforts have been directed towards devices to perform both hasty and deliberate breaches of minelfelds. Since breaching must take place while under fire as well as in a more benign enviroument, two distinct activities must be addressed: mine detection and neutralization. The preponderance of developmental effort has been directed towards hasty minefield neutralization and breach with minimum impact on the momentum of the The Surface-Launched Unit, Fuel-Air Explosive (SLUFAE) mine neutralization system has been designed to provide a rapid standoff breach of a minefield up to 240 meters in depth. SLUFAE is scheduled for type classification standard during FY 1981. Follow on systems in this program include modification of the British Giant Viper projected line charge which will accomplish both explosive neutralization of mines and NATO standardization, and a vehicle-mounted road mine detector to rapidly clear lines of communications, a vehicle-mounted magnetic signature duplicator to cause premature actuation of mines employing magnetic influence fuzes, and a manportable line charge mine neutralization system capable of clearing antipersonnel mines, barbed wire, and other barrier devices.
- G. (U) RELATED ACTIVITIES: Joint Service EOD (tems are funded and developed by the Navy as the single manager for EOD items in Program Elements 6.36.54.N and 6.46.54.N, EOD Equipment to avoid duplication. Countermine developments in this program element (PE) follow from advanced development (AD) efforts in PE 6.36.19.A, Countermine and Barrier Systems. countermine efforts are closely coordinated with the Development Project Office for Selected Ammunition, Dover, New Jersey, who is responsible for the development of mine fuzes, sensors, kill mechanisms, and logic in PE 6.36.06.A, 6.36.19.A, and 6.46.19.A, Landmine Warfare. The Army has significantly reduced the cost and developmental effort on Surface-Launched Unit, Fuel-Air Explosive (SLUFAE) by utilization of Navy-developed fuel-air explosives and rocket technology. The Army continues to monitor the joint Fuel-Air Explosive (FAB) II program to avoid duplication. Available Navy in-house capability has been used to produce developmental hardware. US continues to monitor RDTB efforts of foreign nations, particularly NATO, for technological breakthroughs in the detection and neutralization of landmines. The procurement and testing of the British Giant Viper Mine-Clearing Line Charge and the Israeli Portable Mine Neutralization System (POMINS) are examples.

UNCLASSIFIED

11:402

Program Element: #6.46.12.A

DOD Mission Area: #214 - Mine Warfare

Title: Countermine and Barriers
Budget Activity: 4 - Tactical Programs

H. (U) WORK PERFORMED BY: Explosive Demolitions is the responsibility of the US Army Armament Research and Development Command (ARRADCOM), Dover, NJ. The US Army Mobility Equipment Research and Development Command (MERADCOM), Fort Belvoir, VA, is assigned responsibility for the Army Countermine and Barrier Program. In-house support is provided by: Navel Weapons Center, China Lake, CA; Naval Surface Weapons Center, White Oak, MD; US Army Test and Evaluation Command, Aberdeen, MD; Yuma Proving Ground, Yuma, AZ; and the US Army Missile Command (MICOM), Huntsville, AL. Contractors include: Honeywell Corporation, Hopkins, MN; Lanson Industries, Cullman, AL; Chrysler Corporation, Detroit, MI; Cubic Corporation, La Jolla, CA; and Martin Marietta, Orlando, FL.

1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1980 and Prior Accomplishments: In FY 1975 a track-width mine plow was developed from a Soviet design, but was terminated because of blast vulnerability. During FY 1976, initial Surface-Launched Unit, Fuel Air Explosive (SLUFAE) prototype items were fabricated, and engineering design tests were conducted against a live mineflet. IN FY 1977, the M122 remote firing device was type classified and limited production initiated. Efforts continued on the bulk explosive (blasting agent) system to assist in the rapid creation of obstacles. The vehicle-mounted explosive container for transport of hazardous explosive items to safer areas and the Hard Overpack to contain leaking chemical munitions were initiated. In FY 1977, SLUFAE Development Test (DT) II/Operational Test (OT) II launcher hardware and initial prototype rounds with electronic fuzes were procured. Surface-Launched Unit, Fuel-Air Explosive (SLUFAE) reliability, availability, and maintainability (RAM) tests and logistic support concept tests were conducted. Artic and tropic testing on the SLUFAE was completed, and the compilation of the SLUFAE technical data package was initiated. During FY 1978, the mine-clearing roller was type classified standard and production initiated. Initiated engineering development (ED) on the vehicle-mounted road mine detector. All necessary experimental work on the detector had been performed, and the proposed system was ready for full-scale development. Initiated ED on an overhead prototype shelter for troop positions. During 1979, Developmental Testing (DT II) on the blasting agent was completed, and development test and operational testing (Dt/OT II) tests on the overpack were conducted. The vehicle-mounted explosive container was transferred to Navy Explosive on inance Disposal (EOD) for development. Completed DT/OT II on SLUFAE and development was transferred to Navy Explosive on inance Disposal (EOD) for development. Completed DT/OT II on SLUFAE on development to conduct of IIA to resolve operational problems with
- 2. (U) FY 1981 Program: Type classify SLUPAE. Conduct DT II/OT II on the Vehicle-Mounted Road Mine Detector. Continue evaluation of the British Giant Viper System. Type classifiy the chemial munition container, Hard Overpack. Continue testing combat shelters and initiate production on the blasting agent.

UNCLASSIFIED

Program Element: #6.46.12.A DOD Mission Area: #214 - Mine Warfare Title: Countermine and Barriers
Budget Activity: 44 - Tactical Programs

- 3. (U) PY 1982 Planned Program: Continue ED of vehicle-mounted road mine detector (VMRMD). Initiate ED on the portable mine neutralization system (POMINS), the vehicle magnetic signature duplicator system (VEMASID), the Bridge Destruction Device, and modify the Giant Viper fuze mechanism.
- 4. (U) FY 1983 Planned Program: Type classify the vehicle-mounted road mine detector. Continue ED on the Giant Viper fuze, portable mine meutralization system, the vehicle magnetic signature duplicator, and the Bridge Destruction Device.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

FY 1932 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 6.46.16.4 DOD Mission Area: #211 - Close Combat Title: Fighting Vehicle Systems (FV.)

Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTIFIES	FY 1930 Actual 34637	FY 1981 Estimate 41651	FY 1982 Estimate 106721	FY 1983 Estimate TBO	Addition of To Completion TBD	Total Estimated Cost## TBD
0258	Infantry Fighting Vehicle (IFV) Cavalry Fighting Vehicle Fighting Vehicle Systems (FVS)	34637	41651	106721	TBD	Гво	16A , (Bb)

^{*}includes one automotive test rig. **includes FY79 and prior.

.L-405 (1. 31 Mar 81

^{8. (}U) SRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Warsaw Pact doctrine envisions the employment of highly mobile, armor-heavy maneuver forces supported by massive artillery fire and all strikes to rapidly breach energy defenses and penetrate deep into rear areas. The mobility, firepower, and survivability of these forces are being enhanced through an ongoing moderalzition program. In apposition to the numerically superior Warsaw Pact forces is the NATO Combined Arms Leam. In the 1980's, the primary antiarmor system within that team will be the MI main battle tank. However, in order to defeat the total threat array, other systems within the combined arms team must provide combatt capabilities which are complementary to and compatible with the MI. The Infantry and Cavalry Fighting Vehicles (IFV/CFV) were developed to provide these capabilities in both mounted and dismounted operations. They are required to more fully enhance the capabilities of the tank, and to accomplish those tasks which the tank cannot perform. The IFV and CFV will provide to the combined arms to a an improved armored full-track fighting vehicle which substantially increases the cross-country mobility, firepower, and an divability of combat infinity and armorel reconnaissance squads. Both IFV and CFV provide a two-man turret which mounts the Vehicle Rapid Fire Weapon System (VRFVS), a stabilized, dual-feed 25mm weapon, and a 7.05mm coaxial machinegun. Both coati gurations mount the Tube-Linniched, Optically Tracked, Mire-Outled Missile (TOM) system. The IFV carries a nine-man squad with an adaptation for six Firing Port Weapons (PPM). The CFV carries a five-man squad and the same armsment as the IFV (1803 the FPM) and is prin-

Program Element: 4.35.16.4 900 Hission Area. #211 - Close Combat Title: Fighting Vehicle Systems (FVS)
Budget Activity: 14 - Tactical Program

climits designed to accomplish reconnaissance, security, and economy of force operations. Both IFV/CFV are compatible with the MI Fink System, have an inherent swimming capability, and are att-transportable in the CI41 and CSA algebraic.

C. (II) BASIS FOR FY 1932 RDTE REQUEST: Funds requested are to support the continued development of Test Measurement and Diagnostic Equipment (TUDE), and skill performance aids (SPA) materials; additional logistics development to permit immediate government assumption of integrated logistics support; development of training devices; and apply modification for TOW Missile quilince electronics for integration of TOW 2. The Initial Operational Capability (ICC) is three months later because of extended production leadtimes and reduced quantities of production weblicles during initial production buys. The Army is planning to implement a competitive program during FY82 for improved maintainability and cost reduction of the integrated Sight Unit (ISU).

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
* Complete OT II on IFV * Army Systems Acquisition Review	Nov 79	Nov 79
Council III (ASARC III) Complete Prototype Qualification	Dec 79	Dec 79
Test - Government (PQT-G) on IFV * Initial Operational Capability (IOC)	Apr 80 22FY83	Jun 80 4QFY92

D. (U) COMPARISON WIFH FY 1931 ROTE REQUEST: (\$ in thousands)

RUTE	FY 1930	FY 1981	FY 198?	Additional To Completion	Total Estimated Cost
Funds (current requirements)	14637	41651	106721	rad	TBD
Funds (as show in FY 1981 submission)	32937	41960	29869	19394	295991)

UNCLASSIFIED

11 -406 C1, 11 Mar 81

Program Element: 5.46.16.A

DOD Mission Area: #211 - Close Combat

Title: Fighting Vehicle Systems (FVS)

Bulget Activity: 44 - Tactical Programs

The FY80 increase reflects a \$1700 reprograming action for the CFV Force Development and Experimentation effort. The FY81 variance is attributable to an inflation adjustment. The amount of \$48855 was added by the President's budget amendment to restore the FY82 program to an executable level. Additional funding will cover increases in contractor estimates for technical manuals, automated test equipment, training devices, TOW 2 conversion, and integrated logistics amport (ILS) requirements to facilitate the Army's ability to meet its projected IOC in 20FY33. Increases beyond (A) are currently under

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

		FY 1980	FY 1981	FY 1982	FY 1983	Additional To Completion	Estimated Cost*
ì	Weapons and Tracked Combat Vehicle						
ŀ	Procurement, Army:						
ŀ	Funds (current requirements)	231600	52770	809800	TBD	TBD	CBO
	Funds (as shown in FY 1981						
	submission)						
	FVS	225400	464400	534700	Not Shown	48526 10	n116500
	Quantities (current requirements)	100	400	690	600	51.32	6882
	Quintitles (as shown in FY 1981						
	submission)	298	400	600	Not Shown	8073	9261

The above procurement program combines IFV and CFV under the FVS program. The current procurement requirements as shown are based on a sole-source procurement strategy. Although a competitive second-source program has been initiated with preliminary efforts ongoing to identify a second producer, the above program does not include funds to fully amplement a second *Includes FY79 and prior years; does not include initial spares.

D259 - Budget increases from the FY81 submission shown in the current requirement are due to several fators. The latest

UNCLASSIFIED

11-407 Cl. 31 Mar 81

Program Element: 6.46.16.4DOD Mission Area: $\boxed{f211}$ Close Combat Title: Fighting Vehicle Systems (FVS)
Budget Activity: 14 - Tactical Program

estimates for production were derived primarily from contractor proposal data and revised contractor estimates for the outyears which reflect considerably higher projections for inflation than previously submitted. In addition, there were added requirements for Test Measurement Diagnostic Equipment which increased the total vehicle program cost. The vehicle quantity initial operational objective (100) was decreased from 9,261 to 6,882 per Department of the Army direction.

UNCLASSIFIED

11.408

Program Element: 6.46.16.4

DOD Mission Area: #211 - Close Combat

Title: Fighting Vehicle Systems (178)
Budget Activity: 14 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The Fighting Vehicle Systems (FVS) program has a twofold objective. The first objective is to develop a full-tracked, lightly armored Infantry Pighting Vehicle (IFV) which provides the mechanized infantry with protected cross-country mobility and vehicular-mounted firepower necessary to accomplish assigned missions. The second objective is to provide a Cavalry Pighting Vehicle (CFV) for the armored cavalry and the mechanized bittilion scout squads which allows them to accomplish reconnaissance and security missions. The IFV, with its stabilized 25mm cannon and 7.62mm machinegum, the TOW antitank guided missile system, and six firing port weapons, will provide a large volume of firepower at close and long ranges during both day and night operations. Its armor protection is adjufficantly increased over the current Mil3 armorel pesonnel carrier due to spacel laminate armor. Its speed and mobility are compatible with the XM1. The CFV is a modified IFV with a different storage configuration and no firing port weapons. A unique capability of the IFV and CFV is the stabilized turret drive which permits the main gun and machinegum to be fired neutrately even when the vehicle is moving rapidly over cough cross-country terrain. The FVS Primary Meapon, 25mm automatic cannon, with an effective range in excess of 2500 meters, delivers both armor-piercing and high-explosive fire with extreme neutracy. The TOW antitank missile is fired from a double-tube, armored launcher which is attached to the turret weapon station. The TOW can defeat any currently known enemy tank at ranges out to 3,750 meters. An M2400 7.62mm machinegum is coaxially sammted within the weapon station and supplements the firepower of the other weapons.
- G. (U) <u>RELATED ACTIVITIES</u>: Program Element (PE) 6.46.17.A, Vehicle Rapit Fire Verpon System (VRF4S), supports the Fighting Vehicle Systems program by providing for a 25mm automatic gun for use with both vehicles. Funds are provided to IFV from the Multiple Launch Rocket System, Program Element 6.33.03.A, for development of the MLRS Derivative Vehicle. The Firing Port Weapon (FPW) project was formerly funded in PE 6.36.07.A, Army Small Arms Program, and the CFV development effort was funded in PE 6.46.29 DH65 in FY80 and prior. The FVS Product Improvement Program under PE 2.17.35 3132 varietivated in FY80 and is funded starting in FY92 to begin PIP developments.
- II. (I) <u>WORK PERFORMED BY:</u> The IFV/CFV engineering development is being conducted by FMC Corporation, San Jose, CA. Major subcontractors involved in this program are General Electric, Pittsfield, MA; Cummins Engine Co., Columbus, IN; and Hughes Aircraft Co. and Hughes Helicopter Co. both of Culver City, CA. Support, as required, is being performed by the US Army Tank-Automotive Command, Warren, MI; US Army Armament Research and Development Command, Dover, NJ; US Army Electronics Research and Development Command, Adelphi, MD; US Army Missile Command, Huntsville, AL; and the Project Manager, TOM/DRAGON, Huntsville, AL.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

UNCLASSIFIED

Program Element: 6.46.16.A

DOD Mission Area: #211 - Close Combat

Title: Fighting Vehicle Systems (FVS)
Budget Activity: 74 - Tactical Programs

1. (U) FY 1989 and Prior Accomplishments: The Mechanized Infantry Combat Vehicle (MICV) program was approved by the Defense Systems Acquisition Review Council (OSARC) in April 1972. Following the source selection process, a cost-plus-incentive-fee contract was awarded to FMC in November 1972 for Engineering Development and Advanced Production Engineering. The Firing Port Weapon (FPW) project was transferred to this program following the Concept Formulation In-Process Review in May 1974. The Modified Mi6 Rifle was selected to enter engineering development as the candidate FPW. relative to the suspension and transmission, tests were terminated in February 1976. During the remainder of FY 1976, transmission problems were corrected and verified. The PQT-G was restarted and Operational Test (OT) II initiated in October 1976. During the final quarter of FY 1976, the Army organizel a Special MICV Task Force to review the Lot of MICV program and make recommendations on vehicle configuration in view of the operational requirements. The Task Force recommended a redirection of the program to develop a single fighting vehicle for the infantry and scout roles which would mount a two-man turret with a 25mm gun and TOW launcher. On 3 November 1976, the Secretary of the Army approved the recommendations of the Task Force. The development of a new Fighting Vehicle was begun with the Award of the sole-source letter contract to FMC Corporation. In January 1977, a Defense Department program budget decision eliminated the one-man turret, 20mm MICV from FY 1979 production and authorized only 27 vehicles in FY 1979. Since these 27 unique vehicles were determined not to be cost effective, the Army terminated the 20mm MICV program in March 1977, and approved the application of its resources for use in the development of the new Infantry and Cavalry Pighting Vehicles. At that time, ongoing PQT-G and Producibility Engineering and Planning (PEP) efforts related to the 20mm MICV were terminated. On 30 July 1977, the MICV Systems Office was officially redesignated the Fighting Vehicle Systems (FVS) Office. The MICV was renamed the infantry Fighting Vehicle (IFV), H2, and the MICV/Scout became the Cavalry Fighting Vehicle (CFV) M3. The PEP contract was awarded in June 1978. Initial TOW firings were successfully conducted in July 1978. A Congressionally directed study (Crizer Task Force) confirmed the requirement for and current design of the IFV/CFV. Further, it recommended against developing a more survivable vehicle at this time. As directed by the Office of the Secretary of Defense, a study of less costly derivatives and force structure changes was conducted by the Mahaffey Study Group which concluded that the current IFV/CFV program was the best in terms of cost and operational effectiveness among all derivative type vehicles considered. First Engineering Development vehicles were received in November 1978. Formal contractor testing begin in December 1978 and government testing in June 1979. The IFV Operational reset II (OT II) training began in July 1979. The test, utilizing four IFV's and mechanized infantry platoen with appropriate support from Fort Carson, CO, verified the operational capability of the system. Operational testing (OT II) of the IFV with armament was completed in November 1979. The final report was published in February 1980. A Force Development Test & Experimentation (FDTE) offort was conducted at Fort Knox with five CFV's to demonstrate the operational equiphlity of the vehicles in the cavalry role. Follow-on development and fix verification testing of two prototype vehicles was initiated in

UNCLASSIFIED

Program Element: 6.46.16.A DOD Mission Area: #211 - Close Combat Title: Fighting Venicle Systems (FVi)

3udget Activity: #4 - Tactical Programs

Sep 80 and is continuing. Development testing (DT II) began in July 1979 and was completed in June 1980. CFV to sting was consucted during April-August 1980. ASARC III/DSARC III decisions made were for type classification, vehicle production testing, and competitive vehicle acquisition in FY82. A sole source contract was awarded to FMC in February 1980 to initiate production. Development efforts began for Test Measurement and Diagnostic Equipment and training devices.

- 2. (U) FY 1981 Program: Engineering development will continue on Test, Measurement, and Diagnostic Equipment (TMDE), skill performance aids (SPA) materials, Depot Maintenance Work Requirements, and additional logistic, support to permit government assumption of integrated logistics support at 10C; integration of ventilated MBC protective masks; development of training devices; and modification for TOW missile guidance electronics to integrate TOW 2 through an engineering change proposed to the current Hughes TOW 2 contract for immediate cut-in. Initial deliveries will begin in May 31. The FY81 program will include First Article Preproduction testing of six vehicles to verify the performance of the system when built in accordance with the full-production process. First Article Preproduction Test is to be accomplished during April-detober 1981.
- 3. (U) FY 1982 Planned Program: Engineering development will continue on the training devices, taproved TOW 2, Test Measurement & Diagnostic Equipment, and other logistics support efforts including Physical Teardown and Maintenance Evaluation. A competitive effort to redesign/repackage the integrated Sight Unit (ISU) for lampoved mintalnability and cost reduction will be implemented by the Army if suitable alternative approaches are proposed. Initial operational capability (IGC) for the Continental United States is scheduled for March 1983. A comparison testing will be performed on two vehicles from November 1981 and April 1982 production runs to verify performance and quality standards. During this period, skill performance aids validation will be achieved as part of the maintenance evaluation. Initial production Test (IPT) will be conducted on a total of eight vehicles commencing in January 1982 and continuing through October 1987.
- 4. FY 1983 Planned Program: Engineering development will continue on training devices, Test Reasurement and Diagnostic Equipment, and TOW 2; completion of Depot Maintenance Work Requirements and Physical Tearlown and Maintenance Evaluation; start development of Extension Training Manuals; and initiation of study for nuclear hardening of the IFV/CFV vehicle system.

 Follow-on test and evaluation effort will be initiated concurrently with initial operational capability to verify the suitability of the entire logistics package to include maintenance manuals and Test Measurement and Diagnostic Equipment (TMDE).
 - 5. (U) <u>Program to Completion</u>: In FY84, Test Measurement & Diagnostic Equipment (TMDE) development will be completed

11-411 C1, 31 Mar 81

HINCLASSIFIED

Program Element: 6.46.16.A

DOD Mission Area: 1211 - Close Combat

Title: Fighting Vehicle Systems (FVS)
Budget Activity: 14 - Tactical Program

and effort on training devices continued. Implementation of efforts to harden the vehicle against nuclear effects will continue.

- J. (U) TEST AND EVALUATION DATA:
- 1. (U) Development Test and Evaluation:
- a. (B) Developmental testing (DT) began in January 1974 with the Mechanized Infantry Combat Vehicle (MICV) and was interrupted in March 1976 for seven months due to unsatisfactory transmission performance. Transmission redesign was achieved and testing resumed in October 1976 continuing through January 1977. The MICV/20mm program was terminated in March 1977 after an Army review determined it was not cost effective for development in view of its operational shortfails. Subsequently, all resources remaining were applied to the development of the Infantry Fighting Vehicle (IFV) and the Cavalry Fighting Vehicle (CFV). Results of MICV contractor testing were based on completion of 142,000 RAH miles and 140,000 rounds of 20mm ammunition fired. Subsequent contractor testing on the IFV/CFV was comprised of 18,000 RAM miles traveled, 118,000 rounds of 25mm ammunition fired, and 56 TOW missiles fired. Contractor testing revealed only minor deficiencies which were all correctable. The IFV/CFV test and evaluation program made maximum use of prior MICV/20mm test data and reentered the development test program at the DT II milestone. The extensive effort since 1974 on the MICV assured concept validation sufficient to warrant committing resources to full-scale development.
- b. (U) Development Testing II (DT II) began in June 1979 at Aberdeen Proving Ground (APG), MD. DT II provided the final technical data for determining the IFY/GFV system readiness for transition into the full-production phase of the acquisition cycle. Developmental testing assured that engineering was reasonably complete; that all significant design problems associated with survivability/vulnerability, human factors, and supportability had been identified; that solutions to these problems were at hand; and that all test issues critical to the production decision had been resolved. Critical milestones are listed: DT II started Jun 79, Interim Evaluation Report (IER) to the Army Systems Acquisition Review Council (ASARC III)-Dec 79; IER to the Defense Systems Acquisition Review Council (DSARC III)-Jan 80; DT II completed Jun 80; Final Report-Dec 79.
- c. (U) Two Infantry Fighting Vehicles (IFV) and one Cavalry Fighting Vehicle (CFV) have undergone DT II at APG. Vehicles are to be used as weapon-mounted fighting stations as well as troop carriers. Vehicles have two-man turrets which incorporate the 7.62mm Coaxial Machinegun; The Tube-Launched Optically Tracked, Wire-Guided (TOW) Missile System and the 25mm

UNCLASSIFIED

Program Element: 6.46.16.A DOD Mission Area: #211 - Close Combat Title: Fighting Vehicle Systems (FVS)
Budget Activity: #4 - Tactical Programs

Automatic Cannon. Except for minor design changes, the configuration tested will also be procured. An improved TOW subsystem, designated Test Measurement and Diagnostic Equipment (TMDE), and the Integrated Logistics Support (ILS) System are still being developed and were not available for test during DT II and OT II. The improved TOW subsystem will be developmentally tested during First Article Preproduction Testing, and the technical data package will be verified during initial Production Testing (IPT). The designated TMDE will also be evaluated during these tests. The IMDE is comprised of the Built-in Test Equipment (BITE), the Simplified Test Equipment-Transitional (STE-T), the Direct Support Electrical System Test Set (DSESTS), TOW Subsystem Support Equipment (TSS-SE), and EQUATE (AN/USM 410). A complete ILS package will be tested during IPT and also during a logistics follow-on evaluation (FOE) scheduled for late FY82.

- d. (U) Reliability results achieved during government testing is based on the following test measurements: 12,500 miles traveled; 27,300 rounds fired by primary weapon and 68 TOW missiles fired. The minimum acceptable value for system performance in test was 195 mean miles between failure (MMBF), reliability demonstrated was 279 MMBF. inintainability Standards require scheduled organizational maintenance and service no more frequently than every six months or 1500 miles. The demonstrated reliability and maintainability results are tabulated in paragraph 3 below. Organizational and OS/GS maintenance performance is expected to improve with the appropriate TMDE and adequate spare parts provisioning. A number of problem areas were recorded in test on the integrated Sight Unit (18U). These included image flutter, a problem noted during previous OT testing; detent mechanism failure of boresight knobs; effect of electromagnetic interference; reticle irightness; faulty thermal switch rhoustat control; and vertical wavy lines in sight picture. Corrective action has been identified for each and will be verified during IPT. Other problems cited during test included a sporadic U-joint torque spike; excessive power converter failures; toxic fumes (high carbon monoxide levels) when firing all weapons in buttoned up configuration; powertrain and powerpack cooling failures; faulty catch bar on driver's hatch; degraded communications due to high noise levels; no ISU backup sight; inadequate test equipment and technical manuals. Corrective action has been identified for each problem area. In nearly all cases, corrections will be incorporated into the production vehicles and ancillary equipment.
- e. (U) The Program Manager, Fighting Vehicle Systems, is 3G Donald P. Whalen, assigned 2 July 1980. The prime contractor is FMC Corporation, San Jose, CA. Some of the major subcontractors include General Electric Corp., Hughes Aircraft Corp., Hughes Helicopter Corp., and Cummins Engine Co. The US Army Tank-Automotive Command (USATACOM) and contractors are preparing qualification test procedures to environmentally test the IFV/CFV and armament. A copy of the PQT-C final report, dated June 1980, was received from the contractor. The developmental tester is the US Army Test and Evaluation Command (TECOM), and the test evaluator is the US Army Materiel Systems Analysis Agency (AMSAA).

UNCLASSIFIED

Program Element: 6.46.16.A

DOD Hission Area: #211 - Close Combat

Title: Fighting Vehicle Systems (FVS)
Bulget Activity: 14 - Tactical Program

f. (U) DT II testing was completed in June 1980 with no significant technical problems beyond those cited above. All significant Army requirements for transportability have essentially been demonstrated in test. Accuracy requirements for the M242 25mm Automatic Cannon exceeded the stated requirements for all rounds and all rates. Reliability, durability, and maintainability requirements for the XM231 Firing Port Weapon have been demonstrated. Results are tabulated in paragraph 3.

2. (U) Operational Test and Evaluation:

- a. (II) A combined Operational Climatic Test/Force Development Test and Experimentation (OCT/FDTE) was conducted during January-March 1976 for the MICV/20mm program. The test was conducted at Fort Knox, KY, using US Army Forces Command (FORSCOM) personnel as player participants. The OCT provided limited data on capabilities, limitations, and safety aspects of the Mechanized Infautry Combat Vehicle (MICV) system in European winter thaw conditions. The FDTE developed mobility/movement rate data on the MICV. The initial Operational Test was conducted by the US Army Operational Test and Evaluation Agency (OTEA) at Fort Benning, GA, using mechanized infantry troops as player participants. The test started 4 October 1976 and continued through 31 January 1977. A need for additional user training and 20mm gun modifications became apparent due to complexity of the one-man fighting station. This test was discontinued as a result of termination of the MICV/20mm gun program in March 1977.
- b. (U) Operational Testing II (OT II) for the IFV was accomplished during October-November 1979 at Fort Carson, CO, by the Army's Operational Test and Evaluation Agency (OTEA). The purpose of the test was to provide data and associated analyses on the operational effectiveness of the infantry Fighting Vehicle (IFV), Firing Port Weapon (FPW), and the 25mm Cannon for consideration in determining a full-scale production decision. The objectives of testing were to provide information on the effectiveness, survivability, reliability, availability, maintainability and integrated logistics support system (ILS) for the IFV system. The organization, doctrine, training, and human factors, as they pertain to the employment of the IFV system, were also evaluated. Operational testing was conducted independently, yet concurrently, with developmental testing. Hardware in OT II included, for the first time, the improved fire extinguisher system (HALON) and the upgraded Phase II sights. Systems used in OT II were similar, but not all had the HALON fire extinguishers and the upgraded Phase II sights. Organizational and direct support maintenance was performed by military personnel; general support maintenance was accomplished by FMC. Results of OT II were presented to the Army System Acquisition Review Council (ASARC III) in December 1979 and the Defense Systems Acquisition Review Council (DSARC III) in January 1980. The OT II test report was available in February 1980.

UNCLASSIFIED

Program Element: 6.46.16.A DOD Misslon Area: #211 - Close Combat Title: Fighting Vehicle Systems (FVS)
Budget Activity: #4 - Tactical Programs

- c. (U) OT II testing was comprised of the following: 3,919 miles traveled; 30,528 rounds fired; and 39 TOM missiles fired. Results of OT II indicated that the Army's requirements have been met in all of the critical areas of test. The test vehicles demonstrated the Army's Materiel Need (MN) requirements for all mobility and transportability chiracteristics in contractor tests, DT and OT. Also, critical firepower requirements were met. In each performance area, the requirement was either met or exceeded for the 25mm Automatic Cannon, the Firing Port Weapon, and the Coaxial Machinegon. The mission profile used for reliability performance is based on combined DT/OT II goals for the IFV/CFV system. Reliability performance during DT/OT II for Mobility, Firepower, and System is summarized in paragraph 3. These estimates are based on 21,495 RAM miles for firepower, 20,982 RAM miles for mobility and support and 49,778 primary weapon rounds fired normalized to a combat mission profile. All technical problems were isolated and appropriate fixes defined. Among the significant technical problems surfaced during test were the following: vibrations in the integrated sight unit with vertical lines in the night mode; universal joint/final drive failures due to cracked materials and improper installation; coaxial machinegon failure due to bad amountion lots, damaged feed chutes and mounts and poor weapon maintenance; insufficient electrical power for "silent watch" mode of operation caused by less than fully charged batteries and possible inadequate power source; heater and ventilation system failures; easily damaged swim barrier; excessive generator failures due to malfunction of diodes; and excessive transmission wear due to engine torsional vibration. Fixes have been identified for each problem, and will be applied and tested prior to the start of initial production.
- d. (U) The Armor and Engineer Board, Fort Knox, KY, conducted a CFV Force Development Test and Experimentation (FDTE) during April-August 1980. This evaluation was accomplished to provide data to determine the adequacy of organization, doctrine, tactics, means of employment, and institutional/exportable training and organizational maintenance training programs envisioned for implementation upon fielding of the CFV System. The test was completed on schedule with all major objectives met.
- e. (D) Survivability testing to include full-up ballistic nondestructive and destructive testing will be accomplished during November 1980-April 1981. The Initial Production Test (IPT) will be accomplished during Jan-Oct 82. The IPT will verify the quality of performance and material when produced in accordance with the Technical Data Package and the full-production process. Comparison Testing is scheduled during Nov 81-Apr 82 and will be conducted by FECOM on two vehicles to verify performance and to insure that production vehicles achieve and maintain quality standards throughout production.
- f. (U) The Logistic support package, complete with TMDE will be further evaluated in a follow-on evaluation (FOE) with IOC Battallon, Nov 82-Apr 83. The logistics evaluation both during and subsequent to FOE, will be met by a dedicated Sample

UNCLASSIFIED

Program Element: 6.46.16.4

DOD Mission Are: 1211 - Close Combat

Title: Fighting Vehicle Systems (FVS)
Budget Activity: 14 - Tactical Program

Data Collection (SDE) effort planned and programed by the Tank Automotive Command (TACOM). The coordination is in process. The collection and evaluation of logistic data will be administered by TACOM. Specific interest will be directed toward the adequacy of technical manuals, maintenance procedures, logistic task allocations, repair times and the adequacy of new training.

1. (II) System Characteristics:

OPERATIONAL/TECHNICAL

CHARACTERISTIC	REQUIREMENT	DEMONSTRATED TO DATE	STATUS	WHERE DEMONSTRATE
Reliability (DT/01 II)				
 Mobility (mean miles between failure) Firepower (mean miles 	600	636	мет	PQT-G/OT II
betweed fillure) - System (mean miles	290	706	мет	PQT-G/07 II
between failure)	195	289	MET	PQT-G/OT II
Maint inability (System) - Maximum-Time To-Repair Organizational, (time not to exceed 4 hrs)	95%	897	CON	РQТ-G
 Maximum-time to-Repair Direct Support, (time not to exceef 12 hrs) 	902	96%	мет	PQT-G
- Maximum-Time-to-Repair	90%	86%	LOW -	PQT-G

UNCLASSIFIED

Program Element: 6.46.16.A

DOD Mission Area: 1211 - Close Combat

Title: Fighting Vehicle Systems (FVS)
Budget Activity: 14 - Tactical Programs

General Support (DS backup) (time not to exceed 12 hrs)

CHARACTERISTIC	REQUIREMENT	DEHONSTRATED TO DATE	STATUS	WHERE DEMONSTRATE
Firepower				
a. 25mm Gun				
- Muzzle Velocity (feet pe	r second)			
· Armor Piercing (APDS-T)	4300-4500	4390	MET	PQT-C
. High Explosive (HEIT)	3000	3573	мет	PQT-C
- Rate of Fire				
. MAXIMUM (rounds per minute)	450-600	Motor Depend.	MET	PQT-G
. Controlled (shots per minute)	200	200	MET	PQT-G
. Lethal Area -	10-20m ² /	$16.7m^{2/}$	MET	PQT-G
- Reliability				
• Mean rounds - between stoppage (MRBS)=	2009	7264	MET	PQT-G
 Mean Rounds between clearable stoppage (MRBCS) 	500	6226	мет	₽QT-G
- Maintainability				
 Mean time to repair - (MTTR) 	15 min	12 mia	MET	PQT-G/OT II

UNCLASSIFIED

Program Element: 6.46.16.A

DOD Mission Area: 1211 - Close Combat Title: Fighting Vehicle Systems (FVS)
Budget Activity: #1 - Tactical Program PQT~G/OT II . Max time of repair -60 m.fn 30 min MET (MXTTR) - Availability .90 .99 MET PQT~G/OT II WHERE DEMONSTRATED CHARACTERISTIC REQUIREMENT STATUS DEMONSTRATE TO DATE - Durability (25 min)
- Barrel life (rds)
- Receiver life (rds) 4000 5000 MET PQT-G/OT II 25000 30000 MET PQT-G/OT II - APDS-F Ammunition MET PQT-G . Penetration I" \$1400m 1270 . Velocity (M/Sec) 1100 MET L/ PQT-G - HEIT Ammunition PQT-G . Velocity (m/sec) 1000 1050 ивт PQT-G . Fracer Rng (meters $PQT \neg G$ b. (ii) Firing Port Weapon HET ~ Sustained Firing Rite 60 rpm 5 min PQT-G intervals (round s per minute) - Min Range (meters)
- Length (in)
- Protrusion (in) 3-5 15-27 TBT 28.5 PQT-G Long 3-5 PQT-G Long 8.5 - Weight (1b) OVER PQT-G - Reliability 3000 4701 4ET PQT-G/OT II . Hean Rounds Between Stoppage

Program Element: 6.46.16.A			Title:	Fighting Vehicle Systems (FVS)
DOD Mission Area: #211 - Clo	se Combat			et Activity: 14 - Tactical Program.
. Mean Rounds between failure (MKBF - Durability)4 ⁵⁰⁰	5289	мет	рот-о/от и
Receiver life (rds)	10000	10000	мет	PQT-G/OT LI
		DEMONSTRATED		WHERE
CHARACTERISTIC	REQUIREMENT	TO DATE	STATUS	DEMONSTRATE
. Barrel life (rds)	10000	Exceeded 10000	MET	PQT-G/OT II
Mobility				
- Range (mi) (Ave 25 mph)	300 ml	303 mi	MET	PQT-C
- Acceleration	0-30 mph in 18-22 sec	19.7 sec	MET	PQT-G
- Fwd Speed	40-45 mph	41.8 mph	MET	PQT-G
- Cbt Weight (lb)	35-40,000	50,000	MET	PQT~G
- Reverse Speed	5-10 mph	13 mph	MET	PQT~G
- Braking Deceleration	35 feet (from 25 mph	24 feet i)	MET	PQT-G
- Ascend Slope	60%	YES	MET	PQT-C
- Min Speed	2.5 mph	YES	MET	PQT-C
- Turning Radius	30'	19.7'	MET	PQT-C
- Water Speed	4.5 mph	4.4 mph	LOW	PQT-G

1/ 1270 meter range @ ~65°F.

MRBS - Firing malfunction which requires more than 10 seconds to clear for the 25mm gun and less than 20 seconds for the Pyring Port Weapon.

MRBCS - Firing malfunction which can be cleared in 10 seconds or less.

UNCLASSIFIED

Program Element: 6.0.16.4 DOD Mission Are c: 1211 - Close Combat

Title: Fighting Vehicle Systems (FVS)
Budget Activity: 14 - Tactical Program

 $\frac{4}{2}$ Firing malfunction which requires 20 sec or more to clear for the FPW.

Final DE II Test Report to be published in Dec 1980. Independent Evaluation Report was published in March 1980.

UNCLASSIFIED

11-419 A

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: 16.46.19.A

DOD Mission Area: 1214 - Mine Warfare

Title: Landmine Warfare
Budget Activity: 14 - Tactical Programs

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

Project		FY 1980	FY 1981	FY 1982	FY 1983	Additional	Total Estimated
Number	Title	Actual	Betimate	Estimate	Estimate	to Completion	Cost
	TOTAL FOR PROGRAM ELEMENT QUANTITIES	8742	9572	8310	9940	Continuing	Not Applicable
DO16	Mine Systems	0	0	3183	5016	Continuing	Not Applicable
D088	Modular Pack Mine System	5199	8698	5127	4924	1158	3576 9
D407	Antitank Artillery Hine XM718	687	229	0	0	0	17644
D568	Ground-Emplaced Mine Scattering System Anti-	2856	645	0	0	0	41644

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program element provides for increased tactical effectiveness and responsiveness of landmines by supporting the development of a Family of Scattersable Mines (FASCAM) which can be dispensed rapidly from helicopters, ground dispensers, cannon artillery and rockets, and tactical aircraft. The minefield continues to be one of the most effective, efficient, and adaptable obstacles available. The increased pace of modern warfare together with the fluidity and porosity of today's battlefield makes the use of labor-intensive, hand-emplaced, logistically burdensome conventional landmines less effective than in previous wars. Current mines, which must be emplaced well in advance of the actual tactical need, lack the responsiveness and flexibility necessary for effective employment in rapidly changing tactical situations. Scatterable mines placed with multiple delivery means provide a formidable threat and deterrent to mass armor attacks such as can be mounted by the Warsaw Pact. Scatterable mines will be used to delay, canalize, or interdict attacking enemy forces and to deny selected areas to the enemy.

C. (U) BASIS FOR FY 1982 RDTB REQUEST: Continue engineering development (BD) on the Modular Pack Mine System (MOPMS) and initiate ED of the off-route antitank mine system (ORATMS).

UNCLASSIFIED

Program Element: #6.46.19.A

DOD Mission Area: #214 - Mine Warfare

Title: Landmine Warfare
Budget Activity: #4 - Tactical Program:

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
unds (current requirements)	8742	9572	8310	Continuing	Not Applicable
Funds (as shown in PY 1980 submission)	8767	10401	13141	Continuing	Not Applicable

FY80 funds were reprogramed to higher priority Army requirements. The FY81 decrease reflects the application of a Congressional general reduction for inflation. The FY82 decrease reflects a delay in initiation of engineering development efforts on new mine systems and restructuring within the program element.

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

	PY 1980 Actual	PY 1981 Estimate	FY 1982 Estimate	PY 1983 Estimate	Additional To Completion	Total Estimated Cost
Ammunition Procurement, Army:						
Funds (current requirements)	29900	61500	58400	64300	196600	480300
(Artillery AT mines) Funds (as shown in PY 1981						
submission)	30900	61500	86400	Not Shown	214500	445000
Quantities (current requirements) (rounds)	13090	27000	25000	28000	84000	205000
Quantities (as shown in FY 1981 submission)	15000	27000	39000	Not Shown	96000	201000

UNCLASSIFIED

Karana ara

Program Element: #6.46.19.A DOD Mission Area: 1214 - Mine Warfare Title: Landmine Warfare
Budget Activity: 4 - Tactical Programs

	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Ammunition Procurement Army:						
Funds (current requirements) (GEMSS XM74/XM75 mines)	9800	12900	35500	19100	97100	174400
Funds (as shown in FY 1981						
(nojesimdus	6700	11800	12600	Not Shown	41600	72700
Quantities (current requirements) (mines)	11000	30000	70000	37000	197000	345000
Quantities (as shown in FY 1981						
submitssion)	12000	30000	30000	Not shown	90000	162000
Other Procurement Army:						
Funds (current requirements) (GEMSS dispensers)	5000	0	12400	9100	30400	190000
Funds (as shown in FY 1981						
submission)	4900	0	12100	Not shown	44700	61700
Quantities (current requirements) (each)	6	0	23	24	78	379
Quantities (as shown in FY 1981						
submission)	12	0	39	Not Shown	184	235

The FY82 decrease in artillery-delivered AT mines is the result of increased procurement unit costs and slippage in prior year production deliveries beyond the normal procurement leadtimes. FY83 and beyond quantities have also been adjusted consistent with OSD consolidated guidance. The increase in GEMSS funding for mines in FY81 reflects higher than anticipated costs for mines. The quantities were reduced to stay within obligational authority. The funding profiles for 82 and beyond reflect a change in Army requirements for GEMSS mines. GEMSS dispenser unit costs for 81 have increased significantly, primarily because of the small quantities. These high costs have resulted in a reduction in quantities planned for FY81 and FY82.

UNCLASSIFIED

Program Element: #6.46.19.A

DOD Mission Area: #214 - Mine Warfare

Title: Landmine Warfare
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The minefield continues to be one of the most effective efficient, and adaptable obstacles available. Conventional hand emplaced antitank (AT) and antipersonnel (AP) mines cannot keep pace with related battlefield activities. To overcome this deficiency, the Army has pursued development of a Family of Ecatterable Mines (FASCAM). FASCAM consists of smaller mines with improved lethality, target sensing and discrimination, and response times, packaged for delivery by multiple means. The first scatterable mine, the M56 helicopter-delivered AT mine, has been fielded in US Army, Europe. Production has commenced on both the M692 artillery-delivered AP mine and the companion M718 artillery-delivered AT mine. The Ground-Emplaced Mine Scattering System with both AT and AP mines has completed development and entered production. The Modular Pack Mine System is well into development and will complete this generation of Army-developed scatterable mines. Scatterable mine systems utilize extensive component commonality during manufacture. The option to emplace minefields when and where desired in a matter of minutes provides the tactical commander with a unique capability which will impact on both friendly and enemy tactics.
- G. (U) <u>RELATED ACTIVITIES</u>: This program follows from advanced development (AD) Program Elements (PE) 6.36.06.A, Land Warfare/Barrier Development, and 6.36.19.A, Barriers Systems, where components and mine hardware concepts are devised. Principal system technical development responsibility is assigned to the US Army Armament Research and Development Command (ARRADCOM), Dover, NJ, under the management of the Development Project Office for Selected Ammunition. Closely related to this PE is the joint-Service development of air delivered scatterable mines (GATOR). The scope of this development is controlled by an approved joint development plan. The Army is developing both Antipersonnel (AP) and Antitank (AT) mines for the GATOR systems using existing components under the Air Force as lead Service. Joint-Service mine requirement: are coordinated through the Department of Defense (DOD) Armaments/Munitions Requirements and Development Committee and the Joint Technical Coordination Group for Bombs, Mines, and Clusters.
- H. (U) WORK PERFORMED BY: Principal Army Management Agency is the Development Project Office for Selected Ammunition, ARRADCOM, Dover, NJ. In-house support is provided by the US Army Mobility Equipment Research and Development Command Fort Belvoir, VA; US Army Test and Evaluation Command, and the Army Materiel Systems Analysis Agency, Aberdeen, MD; and Yuma Proving Ground, Yuma, AZ. Principal contractors are: Aerojet Ordnance and Manufacturing Company, Downey, CA; Hughes Aircraft Company, Fullerton, CA; Honeywell, Inc., Hopkins, MN; Solid State Division, Sommerville, NJ; AAI Corporation, Cockeysville, MD; Chamberlain, Waterloo, IA.
- 1. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Scatterable mine development was initiated in the late 1960's with emphasis on the XM56 helicopter-delivered antitank mine system and the XM692E1 artillery-delivered antipersonnel mine system. During FY

UNCLASSIFIED

11-423

Kiesel . To . . .

Program Element: #6.46.19.A

DOD Mission Area: #214 - Mine Warfare

Title: Landmine Warfare
Budget Activity: #4 - Tactical Programs

1973, the XM56 and the XM692E1 systems entered developmental testing (DT) and the XM718 artillery delivery AT mine system entered engineering development (ED). In FY 1974, the M56 helicopter antitank (AT) mine system was type classified standard. During FY 1975, the M56 AT mine system went into production; Development Test II/Operational Test II (DT II/OT II) continued on the XM692E1 antipersonnel (AP) mine system, and engineering design tests continued on the XM718 AT mine system. Design and testing of the Ground-Emplaced Mine Scattering System (GEMSS) and its associated XM75 AT mines and XM74 AP mines continued with emphasis on system reliability, maintainability, and human factors. Efforts continued on the joint-Service GATOR air-delivered mines in coordination with Navy and Air Force. During FY 1976, the M692 artillery-delivered AP mine was type classified standard and went into initial production. In FY 1977, the M56 helicopter AT mine was fielded; initial production continued on the M692 artillery AP mine; DT II/OT II was completed on the XM718 artillery AT mine and initiated on the GEMSS; advance development on the Midular Pack Mine System (MOPMS) was completed. In FY 1978, DT II/OT II continued on the M692 artillery AP mine, and MOPMS entered engineering development. In FY 1979, initiated full-scale production on the M692 artillery AP mine; conducted DT III on the M718 artillery AT mine, and completed OT II and conducted 75% of DT II on the GEMSS system. In FY80 full-scale production of the M718 at mine was initiated; GEMSS DT/OT II was completed; type classification was accomplished and production initiated; 10PMS Force Development Test and Experimentation FDTE was completed, and an in-process review conducted to determine future program direction. Production of the ADAM M692 AP mines continued.

- 2. (U) FY 1981 Program: Continue production of the M718 AT mine, complete DT III, and conduct production validation IPR. Continue production of GEMSS M128 dispenser and mines, and continue publications preparations and EOD testing of mines. Conduct MOPMS System Engineering Development test and procure long-lead DT/OT II hardware; initiate development of training aids and manuals. continue ADAM M692 production, complete DT III, and conduct production validation IPR.
- 3. (U) PY 1982 Planned Program: Continue GEMSS production and RDTE of manuals. Conduct final Engineering Development tests for MOPMS. Procure Developmental Testing II/Operational Testing II hardware; conduct DT II and initiate OT II. Initiate engineering development (ED) of the off-route antitank mine system (ORATMS), to include the evaluation of design approved materiels, man/weapons interface studies, and development of engineering models for evaluation of alternative approaches that will lead to selection of the most cost effective hardware.
- 4. (U) FY 1983 Planned Program: Continue ED on the off-route Antitank Mine System. GEMSS production will continue and ROTE of manuals will be completed. MOPMS development will be near completion.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

11-424

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D098
Program Element: #6.46.19.A
DOD Mission Area: #214 - Mine Warfare

Title: Hodular Pack Mine System (MOPMS)
Title: Land Mine Warfare
Budget Activity: 14 - Tactical Programs

- A. (U) <u>DETAILED BACKGROUND AND DESCRIPTION</u>: The Army has been developing a Family of Scatterable Mines (FASCAM) to replace current labor-intensive, logistically burdensome conventional mines. These small, highly lethal, scatterable mines are delivered by artillery, ground vehicle, helicopter, and tactical aircraft. This new capability to deliver mines rapidly acts as an effective combat multiplier. One of these systems, the Modular Pack Mine System (MOPMS), can be used independently or in conjunction with other FASCAM systems, natural or manmade obstacles, and conventional mines to provide a rapid means of emplacing tactical, point or protective minefields, and to close lanes and gaps in existing minefields. MOPMS consists of a manportable module which serves as the shipping, storage, and dispensing container for 21 mines, AT, AP, or a mix. A remote command dispense capability will be provided to permit key areas to remain free of mines until tactically appropriate. The module can be recovered for reuse if the mines are not dispensed. MOPMS utilizes the baseline PASCAM components (commonality of batteries, safing, and arming mechanisums, and some electronic), thereby accelerating the development at a significantly reduced risk.
- B. (U) <u>RELATED ACTIVITIES</u>: This project follows from advanced development Program Element 6.36.06.A, Land Mine Warfare, where components and the concept were devised. Principal system technical development responsibility is assigned to the US Army Armament Research and Development Command (ARRADGOM), Dover, NJ, under management of the Development Project Office for Selected Ammunition. MOPMS is being developed under the family concept and utilizes a high degree of component commonality with other FASCAM systems.
- C. (U) MORK PERFORMED BY: Principal Army Management Agency is the Development Project Office for Selected Ammunition, ARRADCOM, Dover, NJ. In-house support is provided by the US Army Test and Evaluation Command and the Army Materiel Systems Analysis Agency, Aberdeen, MD. Principal contractors are: Aerojet Ordnance and Manufacturing Company, Downey, CA; Hughes Aircraft Company, Fullerton, CA; and Honeywell Incorporated, Hopkins, MN.

D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

1. (U) FY 1980 and Prior Accomplishments: In FY78, conducted Validation In-Process Review after system concept was demonstrated. During FY79, initial prototype hardware was procured, and engineer design test conducted, demonstrating achievement of acceptable patterns from the dispenser and satisfactory functioning of prototype electronics. The XM71 remote control unit was fabricated. Initial engineering tests were conducted satisfactorily. Furing FY80, Force Development Test and Evaluation (FDTE) was conducted and an IPR held. The first systems engineering development test hardware was procured.

UNCLASSIFIED

Project: #D088
Program Element: #6.46.19.A
DOD Mission Area: #214 - Mine Warfare

Title: Modular Pack Mine System (MOPMS)
Title: Land Mine Warfare
Budget Activity: 14 - Tactical Programs

2. (U) FY 1981 Program: Conduct System Engineering Development Tests with PY 1980 hardware and adapt design based on test results. Procure final systems engineering development test hardware and long-lead development test and operational test (DT/OT) hardware. Initiate development of skill performance aids (SPA) and technical manuals to support Army training pro-

- 3. (U) FY 1982 Planned Program: Conduct final Engineering Development Tests. Complete fabrication of Developmental Test II/Operational Test II (DT II/OT II) hardware and initiate testing.
 - 4. (U) FY 1983 Planned Program: Complete DT II/OT II and conduct a Development Acceptance In-process Review (DEVAIPR).
 - 5. (U) Program to Completion: Type classify standard for Army use and initiate Procurement in FY84.
 - 6. (U) Major Milestones:

Major Milestones Validation In-Process Review Developmental Testing II Operational Testing II Developmental Acceptance In-Process Review and Type Classify Standard Initial Procurement

Current Milestone Dates 3QFY82-2QFY83 1QFY83-2QFY83 3QFY83

Shown in FY 1981 Submission 10FY78 3QFY82-2QFY83 1QFY83-2QFY83

Milestone Dates

3QFY83 PY84 PY84

UNCLASSIFIED

11-426

Kilkery

Project: #D088
Program Element: #6.46.19.A
DOD Mission Area: #214 - Mine Warfare

Title: Modular Pack Mine System (MOPMS)

Title: Land Mine Warfare

Budget Activity: #4 - Tactical Programs

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
RDTE Funds (current tequirements)	5199	8698	5127	4924	1158	35769
Funds (as shown in FY 1981 submission)	4052	9462	7414	-	1972	33563
Quantities (current requirements) Quantities (as shown in FY 1981	Not Appli none show					

The total estimated cost is based on contractor and government experience gained on this and other FASGAM development and production efforts and is considered good. Low risk characterizes remaining development effort.

Other Appropriations: Assumition Procurement, Army	•					
Funds	0	0	0	0	18700	124800
Quantities (Modules)	0	0	0	0	1080	10525

Changes in the RDTB profiles reflect the following: In FY 1980, increased costs were caused by prototype design complexity and were financed by below threshold reprograming. PY81 decrease reflects the application of general Congressional reductions. PY82 and PY83 changes reflect an internal program restructuring of the PE.

11-427

A GARAGE STA

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.20.A

DOD Mission Area: #211 - Close Combat

Title: Tank Systems
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	FY 1980 Actual 51784	FY 1931 Estimate 51569	FY 1982 Estimate 29063	FY 1983 Estimate 13602	Additional to Completion O	Total Estimated Cost 697034	
DG20	Tank. XM1	51784	51569	29063	13602	0	697034	

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This element supports the development of the XMl tauk, a four-man, highly mobile, fully tracked combat vehicle with significantly improved survivability, and firepower. The XMI mounts a 105-millimeter main gun and three machine guns. The XMI's improved day/night fire control and shoot-on-the-move capabilities assure a high probability of first round hits at engagement ranges. High acceleration and cross-country speeds provided by a 1500 horsepower turbine engine and improved suspension system make the XMI tank a more difficult target for opposing ground and air forces. The XMI is required to counter ever-improving enemy armor threats of the 1980's and 1990's. It will replace the M60-series tank as the primary ground combat offensive weapon in the Army's combined arms team.

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

- 1. (U) The final phases of the third Development Test (DT III) will be completed in January 1982 when nuclear effects blast testing and validation of equipment publications is finished. The results of the development and operational testing completed in FY 1981 will be the basis for further efforts in reliability and maintainability growth in areas where improvements are cost-effective and savings can be realized. The ten XMI's which accrued high mileage during development and operational testing will be refurbished at the Anniston Army Depot prior to redistribution to meet Army inventory requirements. The refurbishment of these tanks will assist in the development and validation of the Army's overhaul program for the tank.
- The funds requested are necessary to accomplish the developmental work scope required to provide a fully developed XHI tank system capable of being operated and maintained by Army tactical and/or supporting units.

11-428

Kildering

Program Element: #6.46.20.A

DOD Mission Area: #211 - Close Combat

Title: Tank Systems Budget Activity: 14 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Complete Development Test/Operational	September 1979/	July 1979
Test (DT/OT) II	Pebruary 1979	
Defense Systems Acquisition Review Council (DSARC) III	April 1979	April 1979
Award-Low Rate Initial Production (LRIP) Contract	May 1979	May 1979
Delivery of First LRIP Tank	Pebruary 1980	February 1980
Conduct DT III/OT III	March 1980/	March 1980/June 1981
	September 1981	
Management Review #1	February 1980	February 1980
Management Review #2	Requirement deleted	July 1980
Management Review /3	Requirement deleted	January 1981
Initial Operational Capability (IOC) (Tank Company)	January 1981	July 1980
Decision to Start Full-Production (DSARC IIIA)	October 1981	June 1981
Award Full-Production Contract (3rd year add-on option)	October 1981	August 1981 (for 3rd year buy)
European Operational Capability		
(Tank Battalion)		

DT/OT III termination date reflects time to complete majority of work scope. The operational capability dates were adjusted due to availability of production tanks and due to the need for remedial gunnery training (IOC only). Office of the Secretary of Defense cancelled the requirement for Management Reviews \$2 and \$3 based on the successful demonstration of XMI mission reliability and power-train durability growth during the extended engineering tests at Fort Knox, KY, in June-December 1979. A combination of FY 1979 and FY 1980 funding shortfalls, production base start-up problems, and short-comings in XMI reliability and durability performance in testing due to production quality problems have necessitated post-pointing the full-production decision, shifting the full-production contract award to a FY81 add-on option buy, and deferring achievement of the first XMI battalion-size unit in Europe until the second quarter FY 1982.

Program Element: #6.46.20.A

DOD Mission Area: #211 - Close Combat

Title: - Tank Systems
Budget Activity: #4 - Tactical Programs

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	51784	51569	29063	13602	697034
Funds (as shown in FY 1981 submission)	49549	51320	14866	101	665087

Increases in funds over those previously reported result from: FY80, increased by the Army \$1,999,000.00 for additional turbine engine durability efforts to achieve long-term life-cycle cost savings; remaining FY80 and FY81 cost increases compensate for the impact of inflation; FY82, cost of deferred development and testing of training devices, increased scope of integrated logistic support efforts to achieve enhanced system support capabilities, and cost effective reliability and maintainability improvements to achieve long-term operating and support cost savings. FY83, complete logistic support development and the near-term reliability and maintainability program for the initial production XM1 tanks.

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Weapons and Tracked Combat						
Vehicles Procurement:		•				
Funds (current requirements)	717800	1147500	1346800	1448000	12474700	17710200
Funds (as shown in FY 1981						
submission)	71 3900	1100300	1078500	-	7936700	11404700
Quantities (current requirements)	309	360	569	627	5103	7058
Quantities (as shown in FY 1981			_			
submission)	352	569	720	-	5307	7058

11-430

A (1.

HMCLASSIFIED

Program Element: #6.46.20.A

DOD Mission Area: #211 - Close Combat

Title: Tank Systems
Budget Activity: #4 - Tactical Programs

DOD MIASTON MEAN VEIL CLOSE OF	. Veri Oroge Compac		Budget Metricy. 15 Tuestest 1001 mas				
	PY 1980 Actual	FY 1981 Estimate	PY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Estimated Cost	
Military Construction, Army: Funds (current requirements) Funds (as shown in PY 1981	18900	-	7800	10700	8000	45300	
submission)	5800	-	-	_	2500	8300	

- Procurement: The reduction in tank buy quantities in PY80 through PY83 was caused by a composite of escalation, programatic changes, contractor claims, and cost growth. To stay within budget limitations, the FY79 and FY80 production contracts were renegotiated. These changes necessitated baseline changes in FY81 thru FY83 and beyond to reflect the maximum procurable tanks within funding limits. In regard to funding variations, the increase in FY80 was due to escalation adjustments and Congressional plus-up of spares. FY81 and FY82 increases are due to escalation adjustment increases in advanced procurement, spares, and training equipment. When applied, the FY83 increases reflected an additional procurement of 82 tanks and advance procurement for an additional 278 tanks to be procured in FY84. The funds provided by these adjustments were considered in maximizing the number of XMI's to be provided in FY's 80 through 83.

- Military Construction: The increase in FY90 provides for gunnery range upgrade at Fort Knox, KY; in FY82 reflects a shared cost of gunnery range upgrades at Grafenwoehr, GE; in FY83 for institutional training facilities at Alerdeen Proving Ground, MD and for construction at conduct-of-fire trainer sites; and in FY84 expected construction at camps and stations where XM1's are located.

UNCLASSIFIED

11-431

Actorious Same

Program Element: #6.46.20.A DOD Mission Area: #211 - Close Combat Title: Tank Systems
Budget Activity: #4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Congress terminated the XM803 Main Battle Tank program in FY 1972 as unnecessarily complex, excessively sophisticated and too expensive, and directed initiation of a new tank prototype program. The objective of this program is to counter the quantitatively superior and increasingly sophisticated tank forces of the Warsaw Pact by producing a qualitatively superior tank for use as the primary ground combat weapons system in a highly mobile, sustainable, combined arms force. The XHI will be superior in the areas of survivability, firepower, and mobility, thereby providing a dramatic increase in combat capability. The ballistic protection offered by special armor coupled with the tank's inherent agility makes the XM1 significantly more survivable than the M60 tank. Likewise, a reduced silhouette and fuel and main-gun ammunition compartmentalization increase the tank's and crewmen survivability. Improved direpower is provided initially by a 105 millimeter (mm) gun and subsequently (planned for initial production in late FY 1984) a 120mm gum. The 1500 horsepower turbine power package coupled with the high performance suspension system provides superior cross-country mobility. The XMI Tank Program was approved on 18 January 1973 and contracts awarded to General Motors and Chrysler for competing prototype designs. Evaluation of the prototypes was completed on schedule (July 1976); however, the Defense Systems Acquisition Review Council (DSARC) delayed the selection of the prototype for engineering development 120 days until a resolicitation to consider a standardized version of the XM1 could be evaluated. Testing of the LEOPARD 2 (Americanized Version (AV)) tank in accordance with agreements reached with the Federal Republic of Germany was conducted (Americanized version (AV)) can't in accordance with agreements reached with the redecat Republic of Germany was conducted from September to December 1916. On it November 1976, Chrysler Corporation was selected to fabricate eleven pilot-model XMI's for development and operational testing in 1978-1979. Results of the test program disclosed that while Army system design requirements were being met overall, significant shortfalls existed in the areas of mission reliability and power-train durability. Subsequently, the Deputy Secretary of Defense in May 1979 authorized the Army to proceed with the first year's production of 110 XM1's, but constrained FY 1980 and subsequent-years production pending the outcome of extended engineering development testing. This extended test program was completed in December 1979 and resulted in the demonstration that prior problems with XMI mission reliability and power-train durability had been solved. The Office of the Secretary of Defense subsequently removed the constraints placed on the program in May 1979.

G. (U) <u>RELATED ACTIVITIES:</u> There is no other program being conducted by other Services that meets the XM1 requirements. The Marine Corps is closely monitoring the XM1 development in relation to their requirement for a main battle tank in a high intensity environment for subsequent operations ashore. Related and nonduplicatory Army activities are being conducted in Program Element (PE) #6.46.30.A, Tank Gun Cooperative Development; and PE #2.35.37.A, Combat Vehicle Improvement Program.

H. (U) WORK PERFORMED BY: The prime contractor for the XM1 is Chrysler Defense Incorporated, Detroit, Mf. Major subcontractors to Chrysler are: Detroit Diesel Allison, Indianapolis, IN; Hughes Aircraft Corporation, Culver City, CA; AVCO-Lycoming, Stratford, CT; and Cadillac Gage, Detroit, MI. In-house work is managed by the Office of the Program Manager, XM1 Tank System with work being accomplished by the US Army Tank Automotive Command, Warren, MI; the US Army Armament Research and Development Command, Dover, NJ; and the Ballistics Research Laboratory, Aberdeen Proving Ground, MO.

UNCLASSIFIED

Program Element: #6.46.20.A

DOD Mission Area: #211 ~ Close Combat

Title: Tank Systems
Budget Activity: #4 - Tactical Programs

I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1980 and Prior Accomplishments: Based on the recommendations of the XMl Defense Systems Acquisition Review Council (DSARC) III, the Deputy Secretary of Defense on 8 May 1979, authorized the Army to proceed with the first production-year buy of 110 XMl's, the majority of which are being used in Development and Operational Test III (DT/OT III), now ongoing. Extended engineering development at Fort Knox, KY, demonstrated that previous shortfalls in XMl mission reliability and power-train durability had been overcome. Lessons learned from this test have been incorporated into the first-year production tanks being used in the third and final Development and Operational Test (DT/OT III) program. The first production tank rolled out of the Lima Army Tank Plant and was delivered to the Army on 28 February 1980 on schedule. DT III started in March 1980 and OT III in September 1980. As a result of production start-up problems, only 41 of 71 XMl's scheduled for acceptance by the Army through November 1980 were available to support planned testing and institutional training programs. The September 1980 start date reflects this shortfall in XMl's for the test program.
- 2. (U) PY 1981 Program: The majority of development testing and all of the operational testing for the XM1 tank will be completed by 30 September 1981. The tank's training devices less the driver trainer will also have completed testing. Integrated logistic support efforts will continue with emphasis on adjustments resulting from lessons learned during testing and development of general support and depot level repair capabilities. The Defense Systems Acquisition Review Council is expected to meet in October 1981 to decide on XM1 full production. Finally, an outcome of the XM1 development and operational testing will be the initiation of a near-term reliability and maintainability growth program, should shortfalls in the production-model tank be disclosed in testing. This effort, tentatively, will continue into PY 1983, or until all XM1 reliability and maintainability requirements are met. With about thirty percent of RAM-D test data scored, the XM1 is meeting or on track to meet all but two durability requirements. In the meantime, work is ongoing to improve the quality of the XM1 coming off the production line. The Army is considering an extended RAM-D test for the period June to October 1981 to verify the improvements in tank quality.
- 3. (U) FY 1982 Planned Program: Final developmental testing in nuclear effects blast testing and manual validation, driver trainer evaluation, and close-out actions resulting from DT/OT III, e.g., refurbishment of DT/OT III tanks to a condition ready for reissue to gaining units, will be accomplished during this period. Development of depot-level maintenance capabilities for vehicle and component overhaul will be completed as well as the software package to permit diagnosis of printed circuit boards using Automatic Test Equipment at the general support maintenance echelon. The near-term reliability and mainteninability growth program will continue with emphasia on applying the lessons learned from the test program and developing changes that have long-term operations and support cost savings.

K Carrier of the

UNCLASSIFIED

[1-433

Program Element: #6.46.20.A

DOD Mission Area: #211 - Close Combat

Title: Tank Systems

Budget Activity: 14 - Tactical Programs

- 4. (U) FY 1983 Planned Program: The near-term reliability and maintainability growth program will be completed. XMI used in demonstration testing will be refurbished to a ready-for-issue condition at the Anniston Army Depot.
- 5. (U) Program to Completion: Tropic testing of the XM1 production tank will be accomplished in FY 1984 with completion not later than FY 1985. A funding request for this effort will be identified in the FY 1983 budget submission.

UNCLASSIFIED

Program Element: 16.46.20.A

DOD Mission Area: 1211 - Close Combat

Title: Tank Systems
Budget Activity: 44 - Tactical Programs

J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation: The Army's third Development Test (DT III) is being conducted by the US Army Test and Evaluation Command (TECOM) and independently evaluated by the US Army Material Systems Analysis Activity. DT III started in March 1980 and for the most part will end in September 1981. Nuclear-effects blast testing will be completed in November 1931 and manual evaluations in January 1982. A total of nine production-model XMI's are being used by TECOM to technically evaluate the automotive aspects of the tank; its weapons and fire control; Reliability, Availability, Maintainability and Durability (RAM-D); and environmental effects. Testing is being done at Aberdeen Proving Ground, HD; Yuma Proving Ground, AZ; White Sands Missile Range, NM; and at the Cold Regions Test Center, Fort Greely, AK. The objectives of the test are to determine whether the problems discovered during testing of the pilot-model tank in 1978 and 1979 have been corrected, the production-model XML meets Army requirements and contract specifications, the system support package e.g., manuals, test sets, tools,) is adequate to support the XMI in the field, the XMI's RAM-D requirements have been met, and the XMI is capable of operation in various climatic environments. The assessment of RAM-D performance will support derivation of the XMI's maintenance and logistic burden in an operational environment. These estimates will be used to evaluate XMI manpower and logistic burden at the battalion and theater level and as a basis for future XM1 RAM-D improvements should such improvements prove to be cost effective. The majority of the DT III test program will be accomplished by Army technical experts. However, those aspects of the test which are highly affected by man-machine interface considerations will be partormed using soldiers. In addition to the tank testing, TECOM evaluated the XM1's prototype maintenance troubleshooting trainers in December 1980. This was accomplished at the contractor's plant site in Orlando, FL. Results of the development test will be considered by the Army and Defense Systems Acquisition Review Councils to recommend whether to enter full production of the XMl. These council meetings are scheduled for November and December 1981, respectively. Initial development test result: indicate that the XMI should meet its system performance and RAM-D requirements. By the time the test program is complete, the nine development-test XM1's and XM1's periodically operated by the contractor will have traveled approximately 30,000 miles and fired 12,000 rounds of main-gun amountation. The test is structured to provide for periodic tank configuration changes and validation of these changes. After the test is completed, the nine XMI's will be brought to the final test configuration and will be reissued for use by the Army to satisfy tank inventory requirements and distribution plans. The XM1 production rank differs from the hand-tooled pilot tank tested during the second Development and Operational Tests (DT/OT II) in that he production tank is an assembly-line product that incorporates changes resulting from lessons learned during DT/OT ([(Pebrucy 1978-September 1979) and the extended Full-Scale Engineering Development testing at Fort Knox, KY (June-December 1979). Comments on prior and future XM1 development test programs follow:

UNCLASSIFIED

11-435

Robert Land

Program Element: 16.46.20.A

DOD Mission Area: 1211 - Close Combat

Title: Tank Systems

Budget Activity: #4 - Tactical Programs

a. (U) Prior Development Testing: Phase I of the first Development Test (DT I) was conducted by the TECOM at Aberdeen Proving Ground, MD, from February to April 1976 to provide data for selection of either the Chrysler or General Motors This prototype vehicle and the decision to enter engineering development. Both prototypes successfully demonstrated the shility to meet or exceed XMI requirements. Selection of the prototype XMI for engineering development, initially scheduled for July 1976, was deferred 120 days by the Secretary of Defense pending the outcome of a resolicitation which considered incorporating standard components in accordance with agreements reached with the Federal Republic of Germany. On 12 November 1976, the Source Selection Authority announced selection of the Chrysler prototype for engineering development. Phase II of the first Development Test (DT I), testing of the Leopard 2 (Americanized Version (AV)), ran from September to mid-December 1976. As a result of this test, the Army concluded that the XMI best met Army requirements for a main battle tank. In January 1977, the US and Germany agreed to limit interoperability/standardization efforts to subsystems/components only. The second Development Test (DT II) was run from Pebruary 1978 to September 1979. This test was designed to assess the degree to which eleven pilot-model XMI's met the Materiel Need statement, to demonstrate that engineering development was reasonably complete, and that engineering solutions to problems were in hand. The test disclosed that XMI performance objectives were met, except for mission reliability, and operating hours. Later, extended Full-Scale Engineering Development testing at Fort Knox, KY, demonstrated that mission reliability and power-train durability problems had been overcome. Track-durability problems were recognized as technology pacing items requiring further technical development before significant improvement can be expected. Finally, in the case of the maintenance ratio assessment, it was recogn

b. (U) Future Testing:

(1) (U) Training Devices: Delays in concept definition precluded development testing of all of the prototype XML training devices concurrent with the tank test program. Development testing of these devices will be conducted at the contractor's plant site under the appointes of the US Army Test and Evaluation Command. Two competing prototypes of the XML Unit-Conduct of Fire Trainer (U) (U) will undergo development testing in April 1981 in Daytons, FL (General Electric Company), and Warren, MI (Chrys. Defense, incorporated). The objectives of the development test are to insure that the UCONT engineering designs are complete and meet contract specifications. The development test of the prototype driver trainer will can from be to be easier 1981 at the Sperry Secor Company plant in Fairfax, VA. The objectives of these tests are the

UNCLASSIFIED

Program Element: #6.46.20.A

DOD Mission Area: #211 - Close Combat

Title: Tank Systems

Budget Activity: #4 - Tactical Program:

same as for the competing U-COFT devices. The final climatic-region testing of the XMI is scheduled for Fiscal Year 1984 at the Tropic Test Center, Fort Clayton, The Canal Zone. The primary objective of this test is to assess the effect of high humidity and heat on the tank. Punding and test-support requirements have caused deferral of this test to 1984.

- (2) (U) Production Acceptance Test and Evaluation: In fiscal year 1982, six production-model XM1's produced at the Detroit Arsenal Tank Plant will be subjected to system-performance testing to insure quality of production. Five of these will undergo Reliability, Availability, Maintainability and Durability testing, and the sixth will undergo engineering performance tests. In excess of 20,000 test miles will be run over mixed terrain, and 4,000 rounds of main gun ammunition will be fired. The test will be conducted by the US Army Test and Evaluation Command. As an additional check of quality assurance, a production-model XM1 will be randomly selected each quarter from both tank plants. These tanks will endergo 2,000 miles of Army testing and will fire 100 rounds of main-gun ammunition.
- 2. (U) Operational Test and Evaluation: The third Operational Test (OT III) of the XMI tank is a two-site test being conducted by the US Army Armor and Engineer Board at Fort Knox, KY, and by the US Army Training and Doctrin. Command Combined Arms Test Activity at Fort Hood, TX. The tests began on 16 September 1980 and are scheduled to end by 31 May 1981. At Fort Knox, a 250-mile operational mission profile test of each of four production-model XMI's, is being run by Company H, 2d Squadron, 6th Cavalry. The data collected will be used in conjunction with the development test results to assess the XMI's Reliability, Availability, Maintainability and Durability (RAM-D), and the crews' ability to tactically employ the tink. At Fort Hood, OT III is being conducted using a three-company battalion (41 production-model XMI's in the battalion, plus one XMI in the maintenance support unit. The test started with the handoff of the XMI to the armor unit and is projecting with individual, crew, and unit training as the unit transitions from a fully trained, combat-ready M60 tank battalion to an operationally effective XMI unit. The test includes crew and small unit maneuver exercises, individual tank and plus one xmit in the daylight and night. The test unit is the 2d Battalion, 5th Cavalry, lst Cavalry Division. The Operational Test and Evaluation Agency is responsible for managing and independently evaluating operational tests at both sites. The objectives of the tests are to: assess the RAM-D performance of the production-model XMI; determine if the production-model XMI incorporates, without crews and maintenance personnel; and provide the data with which to assess the logistic supportability of the XMI in battalion and smaller units. Initial results from the Fort Knox test indicate that XMI mission reliability performance is below expectations and that power-train durability cannot be achieved, if only the Fort Knox test data is considered. The principal causes of the shortfalls are immature production processes and in

UNCLASSIFIED

11-437

Responsible of the control of

Program Element: #6.46.20.A

DOD Mission Area: #211 - Close Comba:

Title: Tank Systems
Budget Activity: #4 - Tactical Programs

Hay-June 1981 timeframe and benefiting from remedial improvements to the production base. The XMI tanks will accrue a total of over 28,000 miles and will fire over 8,500 rounds of main-gun ammunition in the course of the operational test. The results of this test program will assist the Army and Defense Systems Acquisition Review Councils to make XMI full-production recommendations. In addition to the XMI operational test, the XMI prototype maintenance trainers for the turret, engine, transmission, hull electrical systems, laser rangefinder and thermal imaging system, and the ballistic computer will be subjected to operational testing from February through July 1981. The test will be conducted by the US Army Armor and Engineer Board using personnel from the 1st Advanced Individual Training Brigade, Fort Knox, KY (for the Turret Organizational Maintenance Trainer), and the US Army Ordanace Center and School, Aberdeen Proving Ground, MD (for the other trainers). The Director of Training system and training contribution; the ability of soldiers to apply skills learned on the trainers to actual XMI hardware; and the reliability, availability, maintainability, safety features, and support aspects.

- a. (U) Prior Operational Testing: Phase I of the first Operational Test (OT I) was conducted by the Operational Test and Evaluation Agency (OTEA) at Aberdeen Proving Ground, MD, during April 1976. This test was accomplished in conjunction with the first development test using one prototype vehicle and one automotive test rig from each contractor (Chrysler and General Motors). Both prototypes met the operational effectiveness objectives required for that stage of development. Phase II of OT I tested the the German Leopard 2 (Americanized version) prototype and was completed in December 1976 at Aberdeen Proving Ground, Md, by OTEA against the same test criteria used to evaluate the US competitive prototype tanks. As a result of this test the Army concluded that the XMI best met Army requirements for a main battle tank. The second Operational Test (OT II) was conducted by OTEA at Fort Bliss, TX, using five pilot-model XMI's and personnel from the 3d Armored Cavalry Regiment. The test ran from May 1978 to February 1979 and resulted in ratings of satisfactory in firepower and survivability; marginal in availability, mobility, and fightability; and unsatisfactory in reliability. Satisfactory ratings reflected the superior armor protection of the XMI, the compartmentalization of fuel and service ammunition, and significant improvement in XMI main-gun accuracy over that of the M60Al tank. Harginal assessments reflected the higher fuel consumption of the XMI, XMI track retention and reliability problems, some design features having undesirable human factors implications, and vehicle downtime resulting from the poor reliability of the XMI. The detailed results of this test in conjunction with the Development Test results were the basis for design changes to preclude recurrence of these shortfalls in the production model XMI. Hany of the corrections, particularly those affecting reliability and safety, were validated during the extended Full-Scale Engineering Development testing of the three refurbished pilot-model XMI's
- b. (U) Future Operational Testing: Operational testing of two XM1 prototype Unit-Conduct of Fire Trainers (U-COFT's) will be conducted by the US Army Training and Doctrine Command Combined Arms Test Activity. The test of the U-COFT's will be run at Fort Hood, TX, from July through September 1981, using personnel from the XM1 opera-

UNCLASSIFIED

Program Element: #6.46.20.A

DOD Mission Area: #211 - Close Combat

Title: Tank Systems

Budget Activity: 34 - Tactical Programs

tional test unit, the 2d Battalion, 5th Cavalry, 1st Cavalry Division. The independent evaluation will be accomplished by the Director of Training Development, US Army Armor Center (USAARMC). The evaluation of the U-COPT's will address performance characteristics; the effectiveness of training transfer to the XMI; the reliability, availability, and maintainability characteristics; and safety, human factors, and supportability aspects. The results of this test will be used in the determination of which prototype U-COPT will be procured by the Army. The driver trainer will be tested at Fort Knox, KY, from March through May 1982, using personnel from the 1st Advanced Individual Training Brigade. The Director of Training Development, USAARMC will conduct the independent evaluation. The evaluation of the driver trainer will assess performance igninst the same objectives listed for the U-COFT evaluation. In late fiscal year 1981, five XMI tanks will be delivered to Port Knox, KY, for 4,000 miles of testing per tank in an operational environment. The objective of the test will be to demonstrate that the XMI is maintained its performance requirements. maintaining its performance requirements.

3. (U) System Characteristics:

Operational/Technical Characteristics	Objectives1/	Demonstrated Performance 2/
Acceleration (hard surface, 0	6-9	5.8
degree slope, 0 to 20mph) (sec)		
Speed (mph)		
10% slope	20-25	26
60% slope	3-5	5
Maximum	40-50	45
Cruising range (miles)	275-325	270
Horsepower/Weight(tons)	26-30:1	25:1
fleight (inches)	90~95	93.5
Width (inches)	120-144	144.25
Stowed ammunition (main gun rounds)	\$5-65	55
Reliability (Mean Miles Between Failure)		
ASARC/DSARC III	216 (goal)	145

UNCLASSIFIED

11-439

Water Same

Program Element: 16.46.20.A

DOD Mission Area: 1211 - Close Combat

Title: Tank Systems
Budget Activity: | 14 - Tactical Programs

Operational/Technical Characteristics	Objectives 1/ 272/20027	Demonstrated Performance 2/
Management Review #1	272/200=	326
End DT/OT III	320	4/
Power Train Durability (Probability of		
achieving 4000 miles)		
ASARC/DSARC III	.4 (ggal) .5/.3—	.2
Management Review #1	.5/.3-/	,54
End DT/OT III	.5	474
Maintenance ratio (maintenance/man-hours/	1.25	47

1/ End Development/Operational Test (DT/OT) III requirements except as indicated.

\[
\frac{7}{17}\] DT/OT II and extended Full-Scale Engineering Development test results.

\[
\frac{3}{17}\] Values reflect Office of the Secretary of Defense requirements/thresholds for Management Review #1 in February 1980.

\[
\frac{4}{17}\] To be demonstrated at the end of DT/OT III.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.21.A

DOD Mission Area: #212 - Fire Support

Title: COPPERHEAD (Cannon-Launched Guided Projectile)
Budget Activity: 44 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 9035	PY 1981 Estimate 6091	FY 1982 Estimate 3362	FY 1983 Estimate 2077	Additional To Completion	Total Estimated Costs 159389	
D073	COPPERHEAD	9035	6091	3362	2077	0	159389	

٠,,

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports engineering development of the COPPERHEAD semiactive laser-guided projectile. The COPPERHEAD is a 155mm field artillery projectile fired from conventional howitzers and designed to attack stationary and moving hard, point targets such as tanks with a high probability of achieving first-round kills. The projectile acquires and homes on isser energy reflected from a target which has been illuminated by a laser designator. This projectile will provide the Army the capability to effectively attack armored triggets of the numerically superior Warsaw Pact forces at ranges beyond the capability of direct fire antitank weapons. The high single-shot kill probability provides a force multiplier that significantly improves the Army's antitank capability within the existing force structure.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: The warhead product improvement program initiated in FY81 will be continued with emphasis on completion of confirmatory tests commencement of safety tests and preproduction studies. Investigation of range enhancement feasibility will be continued.

[1-44]

Program Bloment: #6.46.21.A
DOD Mission Area: #212 - Fire Support

Title: COPPERHEAD (Cannon-Launched Guided Projectile)
Buiget Activity: #4 - Factical Programs

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1981 Submission
Initiate Aivanced		•
Development	Feb 72	Peb 72
Initiate Engineering		•
Development	Jul 75	Jul 75
Initiate DT II	Mar 78	Mar 78
Defense Systems Acquisition		
Review Council (DSARC III)	Nov 79	Nov 79
Initial Operational		
Capability (100)	Nov 81	Sep 81

Delay in OSARC III increased materials leadtime, and late delivery of selected initial production facility equipment all contributed to the two-month slip of IOC.

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

	FY 1980	FY 1991	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	9035	6091	3362	2077	159389
Punds (15 shown in FY 1981 submission)	7936	6035	3349	2051	157296

PY80 funds were increased to accommodate required fixes identified as a result of the exhaustive failure analysis following DT/OT. Realignment of internal componentry to permit increased reliability in launch environments, complete redesign of the container and seeker logic changes constitute the significant engineering changes accomplished with the additional funding. These fixes will be incorporated in first production rounds. Increases in FY's 81 and 32 are attributable to the amended budget request and the application of higher fuel, inflation, and civilian pay pricing indices than were applied last year.

Program Element: 16.46.21.A

DOD Missicn Area: 1212 - Pire Support

Title: COPPERHEAD (Cannon-Launched tutled Projectile)
Budget Activity: 44 - Tactical Programs

E. (II) OTHER APPROPRIATION FUNDS: (\$ 1n thousands)

	PY 1980 Actual	Py 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Ammunition Procurement, Army						
Funds (current Requirements)	71200	122100	115700	129600	635400	1118900
Funds (as shown in FY 1931						
submission)	66300	121000	103800	Not Shown		959800
Quantities (current						
requirements)	2100	4300	4229	5075	28682	44386
Quantitles (as shown in PY 1980						
submission)	2100	4300	3900	Not Shown	34086	44386

PY 1980 funds were increased to cover coat increases in the production facility resulting from late receipt of production line equipment, a slightly higher target price for the first procurement and increased cost of long-lead materials. The PY81 increase is attributable to the application of higher fuel, inflation, and civilian pay pricing indices than were applied last year. Dollar and quantity changes for PY82 and the increase in total estimated cost are driven by the inability of the Army to procure COPPERHEAD at an economically efficient rate, near-term readiness and affordability considerations, and the application of higher inflation indices to outyear procurement.

11-443

Additional to be a few of

Program Element: #6.46.21.A

DOD Mission Area: #212 - Fire Support

Title: COPPERHEAD (Cannon-Launched Guided Projectile) Budget Activity: #4 - Tactical Programs

- F. DETAILED BACKGROUND AND DESCRIPTION: A requirement exists to increase the indirect fire capability of field artillery cannon units by providing terminally guided projectiles that acquire and home on stationary and moving point targets with a high probability of achieving first-round kills. The COPPERHEAD projectile satisfies this requirement. The COPPERHEAD is compatible with standard 155mm howitzers and propelling charges and will be included in the basic ammunition loads of appropriate field artillery units. COPPERHEAD fire missions will be conducted using standard artillery procedures and fire control techniques. COPPERHEAD fire missions have been successfully conducted using the Ground Laser Locator Designator (GLLD), the primary designator as well as the remotely piloted vehicle (RPV), and a helicopter-mounted airborne designator. During the final portion of the trajectory, the observer illuminates the target with a narrow beam laser. The COPPERHEAD acquires the reflected energy and guides to the target using proportional navigation guidance. The COPPERHEAD has a maximum range of 16 kilometers and carries a shaped charge wathead that can penetrate of homogeneous armor. The COPPERHEAD will complement rather than replace available projectiles in field artillery cannon units.
- G. (U) RELATED ACTIVITIES: The COPPERHEAD project is related to program elements 6.47.30.A (RPV) (Remotely Piloted Vehicle)) and 6.43.08.A (Precision Laser Designator) where work is being performed to develop laser designators for use by forward observers. An extensive effort is underway to insure maximum component commonality between the Army projectile and the Navy 5-inch projectile in order to avoid duplication of effort and to achieve maximum possible savings. To facilitate the achievement of this objective, these projectile development programs are jointly managed with the Army established as the responsible service.
- H. (U) WORK PERFORMED BY: Martin Marletta Corporation, Orlando, FL, is the contractor responsible for system development. Responsible government Activities include: US Army Armament Research and Development Command, Dover, NJ; US Army Missile Command, Huntsville, AL; Project Manager, Cannon Artillery Weapons Systems, Dover, NJ; US Army Test and Evaluation Command, Aberdeen, MD.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: The COPPERHEAD program began in 1971 with \$1.6 million emergency funds to conduct in-house systems studies. Semiactive laser homing was selected for use during the initial phase of the program because it was the most technically advanced. In Pebruary 1972, contracts were signed with Texas Instruments and Martin Marietts to conduct a two-phase competitive prototype demostration. Each contractor fabricated and delivered fully functional prototype projectiles with telemetry to the Army for testing. In January 1975, a Special Commonshity Defense Systems Acquisition Review Council (DSARC) directed the Army to continue the Advanced Development program. Sixteen of 18 prototype projectiles and six Navy 5-Inch/155mm prototype projectiles were tested and evaluated. DSARC II was conducted in June 1975,

11-444		
	•	

Program Element: #6.46.21.A DOD Mission Area: #212 - Fire Support Title: COPPERHEAD (Cannon-Launched Guided Projectile)
Budget Activity: #4 - Tactical Programs

and approval to enter Engineering Development ED was received. The (ED) contract was awarded to the Martin Marietta Corporation in July 1975 based on the results of the competitive advanced development phase. The FY 1977 funding was reduced by over 31 percent (from \$24.8 million to \$17.0 million) necessitating a complete program restructure which resulted in a program slip of six months and the initiation of ED at a lower level than initially anticipated. During PY 1976 and PY in a program stip of six months and the initiation of the act a towart level than initiative actions and the final two Army prototypes were successfully fired. The first one was fired at a tank illuminated by a designator mounted in a kemotely Piloted Vechicle (RPV), and the second was fired at a moving tank illuminated by a helicopter-mounted designator during darkness. During FY 1977 subsystem testing was completed, and the first series of all-up-round baseline tests was conducted at White Sands Missile Range (MSMR). Producibility Engineering and Planning (PEP) was initiated in December 1976 under Congressionally imposed dollar and time constraints. PEP constraints were lifted in April 1977. During PY 1978 the preliminary Technical Data Package (TDP) was delivered by the contractor and reviewed by government personnel. Naval Avionics Center (NAC) initiated technical data package (TDP) validation efforts in December 1977. Prototype Qualification Fests (PQT) were initiated in March 1978. The Initial Production Facilities contract was awarded in 1977. Qualification tests, development test/operational test II were completed in September 1979. An Army Systems Acquisition Review Council (ASARC) was held in September 1979 which recommended the COPPSHEAD guided projectile enter production beginning in FY 1980. The Naval Avionics Center completed the technical data package desk top validation. DSARC III was held in November 1979, and the Army was permitted to enter production at a rate not to exceed 200 units per month until a threshold reliability has been demonstrated based on production validation test firings. Seeker fixes to provide increased projectile effectiveness under obscured environment conditions were successfully tested in 2QFY80. These fixes and other improvements, which focus on the attainment of enhanced reliability, will be incorporated in first-production rounds. A container redesign to diminish shock and vibration effects of rough handling was completed.

- 2. (U) FY 1981 Program: Payment of the Design-to-Unit Production Cost (DTUPC) Award fee will be bised on the prime contractor's performance. Initiation of a projectile effectiveness enhancement characterized by an improved warhead program which will increase the probability of kill against future armor threats and a range enhancement investigation. The Naval Avionics Center independent validation of the COPPERHEAD Technical Data Package continues.
- 3. (U) FY 1982 Planned Program: Continuation of the projectile effectiveness improvement effort to include completion of improved warhead confirmatory tests, commencement of safety tests and preproduction studies. Completion of independent validation of the technical data package.

UNCLASSIFIED

11-445

Andread College

Program Blement: #6.46.21.A

900 Mission Area: #212 - Fire Support

Title: COPPERHEAD (Cannon-Launched Guided Projectile)
Budget Activity: 46 - Tactical Programs

4. (U) FY 1983 Planned Program: Completion of the warhead improvement program and integration of the improved warhead into production hardware.

5. (U) Program to Completion: Program completed in FY 1983,

UNCLASSIFIED

IINCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.21.A

DOD Mission Area: #212 - Fire Support

Title: COPPERHEAD (Cannon-Launched Guided Projectile)
Budget Activity: 14 - Tactical Programs

J. (U) TEST AND EVALUATION DATA:

1. (U) Development Test and Evaluation:

- a. (U) The COPPERHEAD cannon-launched guided projectile is being developed by the Project Manager, Cannon Artillery Weapons System, Dover, NJ. The development contractor is the Martin Marietta Corporation, Orlando, Florida. Advanced development of COPPERHEAD was highlighted by competitive feasibility demonstrations between Martin Marietta and Texas Instruments. The Naval Surface Weapons Laboratory, Dahlgren, Virginia, also participated by subboting their 5-inch guided projectile to 155mm. The engineering development contract was awarded to Martin Marietta when their prototype guided projectile achieved 8 direct hits out of 12 rounds fired including two hits on moving tanks, a direct hit on a stationary tank that had been designated from a remotely piloted vehicle, and a direct hit on a moving tank designated by the Airborne Target Acquisition and Fire Control Systems (ATAFCS). Prototype Qualification Testing for the engineering development version Developmental Test (DT II) was conductively the US Army Test and Evaluation Command (TECOM) at White Sands Missile Range (WSMR) between March 1977 and December 1978. In July 1978, DT testing was delayed when it became necessary to incorporate design changes for improved reliability, and in-flight performance. A titanium gyroscope was substituted for the original plastic gyroscope, and large-scale integrated circuits replaced hybrid electronics. New projectiles were manufactured in August and testing resumed in September 1978.
- b. (U) Major subtests included environmental qualification, battlefield environment, cold weather performance, and range performance and reliability. In addition, nuclear effects, nuclear-biological-chemical decontuation, and electromagnetic radiation effects were also tested. 168 rounds were fired during the DT II firing program. During severe environmental qualification firings, the projectile reliability was lower than desired. Design changes were identified and a limited number of projectiles which incorporated the design fixes were reworked in August 1979. These projectiles were fired in September and October 1979, and resulted in a significant improvement in reliability. Overall reliability achieved during DT II was 0.69, which was consistent with the desired reliability level for OT testing. The projectile effectiveness and single-shot kill probability met or exceeded the required value as shown in paragraph three below. A technical data package (TDP) suitable for production was provided to the project manager. The TDP included the final design configurations.

UNCLASSIFIED

11-447

As Instituted in the action

Program Element: #6.46.21.A

DOD Mission Area: #212 - Fire Support

Title: COPPERHRAD (Gannon-Launched Guided Projectile)
Budget Activity: 14 - Tactical Programs

c. (U) Ongoing and future testing includes Production Facility Proof Tests to evaluate and refine the new COPPERHEAD production facility. 30 rounds have been allocated for this purpose, 20 of which will be actual all-up-round firings and the remaining 10, component/subassembly tests. This test program is scheduled to be conducted in the second quarter of FY81. In the third quarter of FY81, he Army plans to initiate a 30-round first article test program. This will be followed by a 105-round series of initial profit at initiate a 30-round first article test program. This will produced on the actual production line. It is anticipated that after initial production testing any remaining reliability problems will be identified and corrected prior to the 75-round Special Reliability Demonstration scheduled for January 1982. The purpose of this demonstration is to show sufficient reliability growth (.8 is required) to warrant proceeding into full-scale production. Other tests planned include a 13-round-per-month Lot Acceptance Test Program scheduled to commence with the April 1981 production and a follow-on evaluation scheduled for the first quarter of FY83.

2. (U) Operational Test and Evaluation:

- a. (U) Operational Test I (OT I) was conducted at White Sands Missile Range during 25 March-30 April 1974. Test results indicated that a Forward Observer (FO) section equipped with the Ground Laser Locator Designator (GLLD) would successfully complete an artillery fire mission with the COPPERNEAD. An independent operational test (OT II) was conducted by the Operational Test and Evaluation Agency (OTEA), Falls Church, VA. The test was conducted during the period March-June 1979 at Fort Carson, CO, using soldiers of the 4th Division. The doctrine and tactics used by the test units were in agreement with the operational concept developed by the Army's Field Artillery School. OT II consisted of two phases. The nonfire phase was conducted under both day and night conditions. Laser designator operators were evaluated for their ability to properly designate for the COPPERNEAD guided projectile. Acquisition, tracking, engagement, training, and command-control-communications were also evaluated. During the live fire phase, 71 rounds with full guidance and control were fired against single and multiple moving target arrays in a tactical scenario. Firings were conducted at various ranges under day and night conditions, and several missions were conducted in conjunction with smoke and dust normally present on the battlefield. Of the 71 rounds fired during OT II, 29 rounds hit the target. The results of both DT and OT II generated the requirement for improved reliability discussed above. Of particular concern was degraded performance on a smoke- or dust-obscured battlefield. In response to this concern, significant changes in seeker circuitry were developed and tested by the prime contractor in August 1980 in an exercise called Smoke Week III. The results of this testing demonstrated major improvements in COPPERNEAD performance and utility on the obscured battlefield.
- b. (U) The test unit for OT II was a 155mm Mi09 (SP) howitzer direct support battalion with an Mi98 towed howitzer section attached from the XVIII Airborne Corps. COPPERHEAD projectiles were drawn from the ammunition supply point and transported to the firing unit in tactical vehicles, subjected to the mormal ammunition handling procedures used by combat

UNCLASSIFIED

Program Element: 16.46.21.A

DOD Mission Area: 1212 - Fire Support

Title: COPPERHEAD (Cannon-Launched Guided Projectile)
Budget Activity: #4 - Tactical Programs

soldiers. The fire control procedures and communications procedures used in the test are those currently being employed by field artillery units.

c. (U) A follow-on evaluation test is planned for the first quarter of FY83 utilizing production projectiles. The test will be conducted with an active duty unit equipped with fire control devices scheduled for fielding concurrent with the COPPERNEAD system. The evaluation is planned to approximate the OT II variety of tactical situations and verify the anticipated improvements in reliability and performance on the obscured battlefield.

System Characteristics:

Operational/Technical		
Characteristics	Objectives	Demonstrated Performance
Weight (pounds)	150	138
Length (inches)	54	54.2
Accuracy (CEP-ft)		
Range (km)		
Maximum	16~24	16
Minimum	1.5-3.0	3.0
Single-Shot Kill Probabili	lty	

11-449

 $\widehat{\mathbf{k}}^{p_{k+1}}(x_{k},y_{k+1}) \in \mathbb{N}_{p_{k+1}}$

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.24.A

DOD Mission Area: #211 - Close Combat

Title: High Mobility Multipurpose Wheeled Vehicles (HMNWV)
Budget Activity: #4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 1300	PY 1981 Estimate 2797	FY 1982 Estimate 3074	FY 1983 Estimate 2810	Additional to Completion	Total Estimated Cost 9981	
	QUANTITIES						33	
DH17	High Mobiliry Multipurpose Wheeled Vehicles	1300	2797	3074	2810	0	9981	

- (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The High Mobiltry Mulitpurpose Wheeled Vehicle (HMMWV) Program is a Tri-Service Program, under Army lead, to develop a family of vehicles to meet critical Army, Air Force, and Marine Corps combat, combat support, and combat service support mission requirements and selectively replace vehicles in the 1/4-ton to Dat, compare support, and compare service support mission requirements and selectively replace wehicles in the 1/4-ton to 1/4-ton weight class presently in the tactical wheeled vehicle fleets of the three services. The 1 1/4-ton vehicles of the HMMMV family will utilize a common chassis, minimizing logistic support requirements, in three body configurations specifically tailored for mission requirements by the application of kits. Typical mission requirements include TOW missile carrier, forward air control, rest area and base security, personnel and cargo transport, and command and control. Obsolescent and overage vehicles to be selectively replaced by vehicles of the HMMMV family include vehicles from four families: the JEEP (MIS1), the MULE (M274), the GAMA GOAT (MS61 utility and M792 ambulance), and the M880 I 1/4-ton commercial series. To the maximum extent possible, existing commercial and military components will be used in the HMMMV. A Joint Mission Element Need Statement (LMENS) has been expressed. Statement (JMENS) has been approved.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Funds requested provide for continuing the engineering development of the common chassis, body configurations for the weapons carrier, utility, and ambulance versions, and kits for the High Hobility Multipurpose Wheeled Vehicle (HMMW). Specifically, the FY82 funds are required to: complete the design and fabrication of prototype vehicles, test prototypes for compliance with the performance specification and government requirements, support the tests of the prototypes in a military environment, assess the results of testing, and conduct an in-Process Review to determine acceptable contractor cambidate vehicles to compete for the production quantities.

Program Element: #6.46.24.A

DOD Mission Area: #211 - Close Combat

Title: High Mobility Multipurpose Wheeled Vehicles (HHMWW)
Budget Activity: #4 - Tactical Programs

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Special IPR (Specifications)	December 1979	December 1979
Special IPR (Specifications)	September 1980 M Month	Not Shown
Release RPP for prototype	M Month!	January 1980
test vehicles Award competitive contracts for prototype test vehicles	$M+5$ Months $\frac{1}{2}$	Apr11 1980
Initiate Development Test II/ Operational Test II	M+15 Months ¹	February 1981
Development Acceptance IPR (type classification)	H+21 Montha ¹	September 1981
Award Production Contract	M+21 Monther,	September 1981
Initial Operational Capability	M+21 Monthe 1/ M+49 Monthe /	September 1983

 $\frac{1}{2}$ Milestone dates are inexact due to pending Congressional action on Army's FY 1980 reprograming request.

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

	PY 1980	FY 1981	FY 1982	Additional To Completion	Total Escim ated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1981	1300	2797	3074	2810	9931
submission)	1300	2771	2612	2680	9363

The funding level difference in FY 1981 and increased costs in FY 1982 and beyond are the result of higher fuel, inflation, and civilian pay pricing indices than were applied last year.

UNCLASSIFIED

11-451

Mr. betaken dil be a second

Program Element: #6.46.24.A

DOD Mission Area: #211 - Close Combat

Title: High Mobility Multipurpose Wheeled Vehicles (HMMWV)
Budget Activity: 84 - Tactical Programs

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Batimate	Additional To Completion	Total Estimated Cost
Other Procurement, Army:						
Funds (current requirements)	0	0	3600	0	933900	937500
Funds (as shown in FY 1981						
submission)	0	0	11500	0	926000	937500
Quantities (current requirements)	0	0	0	0	38129	38129
Quantities (as shown in FY 1981						
submission)	0	0	394	0	37735	38129

(U) Procurement funds and quantities in the FY 1981 submission were predicated on development being initiated in FY 1980 which required Congressional approval of Army's FY 1980 transfer request of \$4900 thousand. The FY 1982 estimate of \$3600 thousand is to fund the Army share of FY 1982 support costs which will be the first year of a five-year multiyear procurement contract. FY 1983 procurement funds will be identified by the Army prior to submission of the FY 1983 budget request.

(U) The estimates of total cost and quantities are minimums as they are based on old estimates of Army Unitial Issue Quantities. The Initial Issue Quantity and the Authorized Acquisition Objective based on the recently completed Tactical Wheeled Vehicle Fleet requirements Study are being developed. Also, the estimates do not include the requirements of the Air Force and Marine Corps.

UNCLASSIFIED

Program Element: #6.46.24.A

DOD Mission Area: #211 - Close Combat

Title: High Mobility Multipurpose Wheeled Vehicles (NHMWV)
Budget Activity: 84 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: The High Mobility Multipurpose Wheeled Vehicle (HMMWV) family combines the 1/4-ton through 1 1/4-ton family of wheeled vehicles into a common baseline chassis with variations in body design to accommodate specific roles and missions. The common chassis concept greatly advances the tactical vehicle procurement process for the Services by emphasizing logistics commonality and standardization. The existing fleet of 1/4-ton through 1 1/4-ton wheeled vehicles has demonstrated a degree of obsolescence and operational deficiencies sufficient to warrant immediate upgrading. Also, many of the vehicles are already overage. Vehicles in the current fleet include: the MISI 1/4-ton IREP and M274 1/2-ton MULE (as weapons carriers), the M561 1/4-ton GAMA GOAT, the M792 1 1/4-ton Abulance, and the M880 Series of commercial 1/4-ton trucks. Each is limited in off-road mobility, payload capacity, and survivability when assigned to various combat support, and combat service support roles critical to the success of today's Army. For most of these vehicles, obsolescence and the absence of a warm production base have seriously degraded supportability and maintainability. In the weapons carrier role, both the JEEP and the MULE are grossly overloaded, unprotected, and slow. Vehicles from the HMMWV family are required to selectively replace vehicles in the current fleet. Additionally, the Marine Corps expects to completely modernize its 1/4-ton through 1 1/4-ton tactical wheeled vehicle fleet with common chassis derivatives of the HMMWV. The program is designed to capitalize to the maximum extent possible on existing commercially available vehicle technology. The development effort is minimal and is considered to be a low technical risk. The program will depend on industry for the design and fabrication of prototype test vehicles.
- G. (U) <u>RELATED ACTIVITIES</u>: This program is supported by other Army ground mobility research and development programs, to include: <u>Program Element</u> #6.11.02.A, Project AP22, Research in Vehicle Mobility; PE #6.26.01.A, Tank-Automotive Technology; and PE #6.36.21.A, Vehicle Engine Development. This program also is supported by US Marine Corps research and development PE #6.37.29.M, Project 075J, High Mobility Tactical Truck-Light. Duplication of effort is precluded by Joint Services' participation in the planning and conduct of this program, review and coordination of the program at all Service management levels, and by participation in the development of the Performance Specification and In-Process Reviews.
- H. (U) WORK PERFORMED BY: US Army Tank-Automotive Command, Warren, MI, has the responsibility for implementation of this program. Contractors for the program are to be selected.
- I. (U) PROGRAM ACCOMPLISHMENTS AND PUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: No research and development funds were appropriated for the Army for this program in FY 1979 and prior years. Marine Corps research and development funds in FY 1979 in the amount of \$253 thousand and in

UNCLASSIFIED

11-453

An intermediate the actual

Program Element: #6.46.24.A

DOD Mission Ares: #211 - Close Combat

Titte: High Mobility Multipurpose Wheeled Vehicles (HMMWV)
Budget Activity: 14 - Tactical Programs

FY 1980 in the amount of \$1,000 thousand were provided to the Tank-Automotive Command. Marine Corps plus Army funds were used to provide engineering support in program planning, development of the performance specification, preparation of the Joint Mission Blement Need Statement, mobility studies, release to industry of a Letter of Intent with the performance specification and a request for industry comments on the program plan and performance specification, and the conduct of an In-Process Review to incorporate industry comments to improve the program plan and performance specification.

- 2. (U) FY 1981 Program: Request for Proposals for the design and fabrication of prototype vehicles will be released to industry. Responses will be evaluated and contracts awarded. Development of kits and preparation of the Integrated Logistic Support (ILS) Package will be initiated.
- 3. (U) FY 1982 Planned Program: Development Test II/Operational Test II (DT/OT II) on the prototype vehicles will be conducted. A Development Acceptance In-Process Review (DEVA IPR) will be conducted, and the High Hobility Hultipurpose Wheeled Vehicle (HMHWV) Family will be type classified. A contract for the initial production of vehicles will be awarded. Development of kits and preparation of the Integrated Logistic Support (ILS) Package will continue.
- 4. (U) FY 1983 Planned Program: The ILS Package and kit development will be completed. Required engineering support will be provided. The High Mobility Multipurpose Wheeled Vehicle (HMMW) Family will be adapted to new roles and required capabilities.
- 5. (U) Program to Completion: Conditional Initial Operational Capability (IOC) will be achieved by First Quarter FY 1985. Full-support IOC will be achieved by Third Quarter FY 1985.

UNCLASSIFIED

II-454

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.26.A

DOD Mission Area: #211 - Close Combat

Title: Fire Support Team Vehicle (FISTV)
Budget Activity: 44 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 7720	PY 1981 Estimate 8216	FY 1982 Estimate 9806	FY 1983 Estimate 7070	Additional to Completini None	Total Estimated Cost 33812	
DF 2 3	FISTV	7720	8216	9806	7070	None	33812	

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: Supports development of a Fire Support Team "ehicle, which will provide significantly increased capability to the Fire Support Team Headquarters in support of fast-miving armor, mechanized infantry and cavalry units. Currently, the Fire Support Team Headquarters must rely on a standard Mill Armored Personnel Carrier with limited communications ability, no target location capability, and no armor protection for its laser designator/rangefinder or its operator when in use. The Fire Support Team Team Vehicle provides a mobile, survivable platform with enhanced communications capability, significantly increased target location capability, and an armore environment for laser designation of enemy point targets for destruction by precision-guided munitions such as Copperhead and Hellfire. This program integrates the Ground Laser Locator Designator into an armored targeting station similar to the weapons station of the Improved TOW Vehicle. A North Seeking Gyro compass is being developed and integrated into the targeting station to provide accurate target heading and target elevation information. This information, when combined with target range data from the Ground Laser Locator Designator, provides highly accurate target information for conventional or precision-guided time missions. The program also adds remote capability to the Ground Laser Locator Designator to permit operation from within the vehicle and supports the development of a new intercom which allows transmission or reception of radio traffic on any one of four crew stations. (The Fire Support Team Vehicle will have the necessary radios to allow voice and digital interface with the plagoon forward observers and TACFIRE.) Although the Fire Support Team Vehicle uses the Mill%2, assets will be converted to the appropriate configuration at depot, and new Armored Personnel Carrier procurement will not be required.

C. (U) BASIS FOR FY82 RDTE REQUEST:

1. (U) Continues development of the Fire Support Tenm Vehicle. During this period, the first turce prototype vehicles

UNCLASSIFIED

11-455

An foliation with a

Program Element: 16.46.26.A

DOD Mission Area: 1211 - Close Combat

Title: Fire Support Team Vehicle (FISTV)
Budget Activity: 14 - Tactical Programs

will continue Engineering Development Test-Government. After testing, required changes will be made and the vehicles will be upgraded and refurbished prior to Operational Test. A second lot of three prototype vehicles will be manufactured, fabricated, and assembled during this period. These vehicles will be used for Prototype Qualification Test-Government. Remoted production model Ground Laser Locator Designators funded by this program will be delivered for use on the Fire Support Team Vehicle for development and operational testing.

2. (U) The total estimated development costs are \$33.8 million. This estimate has been reviewed in detail by the Army and is considered adequate to complete this research project.

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1930 Submission
Start Engineering Development Testing II	4Q FY1981	3Q FY1981
Start System Operational Testing II	1Q FY1983	3Q FY1982
Complete All Testing	2Q FY1983	40 FY1982
Production In-process Review (IPR)	2Q FY1983	4Q FY1982

D. (U) COMPARISON WITH FY 1981 RDTE REQUEST:

	FY 1980	PY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE					
Funds (current requirements)	7720	8216	9806	7070	33812
Funds (as shown in FY 1981		-			
submission, PISTV only)	6050	8139	9488	5379	30056

UNCLASSIFIED

Program Element: #6.46.26.A

DOD Mission Area: #211 - Close Combat

Title: Pire Support Team Vehicle (FISTV)
Budget Activity: 44 - Tactical Programs

Funding requirements shown in the FY81 submission were reduced by OSD from \$13.139 to \$8.139 million. Since the FY81 submission, the development funding requirements have been refined and the lack of available funds for this effort in FY81 has extended the length of development time and has resulted in higher program costs as outlined above. The increase from \$6.050 million to \$7.720 million in FY80 funding was a reprograming action caused by actual contractor cost; versus earlier contractor estimates.

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

	FY 1980 Actual	PY 1981 Estimate	PY 1982 Estimate	PY 1983 Estimate	Additional To Completion	Total Estimated Cost
Weapons and tracked Combat Vehicle Procurement, Army:						
Funds (current fequirement)	0	0	0	87600	301600	189200
Funda (as shown in FY 1981						
submission)	0	0	25000	30400	303600	359000
Quantitles (current requirement)	0	0	0	225	755	980
Quantitles (as shown in FY 1981	0	0	57	107	806	970

The FY81 submission estimate for both quantities and dollars was based on preliminary estimates of this FY79 new start development. Quantities and dollar estimates have been refined based on FY80 development efforts. The small change in the total buy is based on unit deployment changes. The cost estimate for the procurement of 980 vehicles has been further refined to show estimated costs.

UNCLASSIFIED

11-457

de la care de la care de

Program Element: #6.46.26.A DOD Mission Area: #211 - Close Combat Title: Fire Support Team Vehicle (FISTV)
Budget Activity: 4 - Tactical Programs

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Artillery Forward Observer Teams, now called Fire Support Teams equipped with the Ground Locator Laser Designator, have opened a new dimension in artillery warfare—precision fire capability to kill moving enemy targets and more accurate and effective fires to support fast-moving mechanized warfare. Because of this increased effectiveness, it can be anticipated that enemy forces will take extra measures to neutralize or destroy the US Fire Support Teams by all means available. It is the vulnerability of the Fire Support Teams and their equipment to enemy fires which required that the Army undertake a development program to protect the Fire Support Teams and equipment to insure their combat survivability and effectiveness. The Fire Support Teams, when supporting highly maneuverable cavalry, mechanized, and armor units, are particularly vulnerable. Cavalry, mechanized, and armor units rely on their mobility and armor protection for their survivability, and their operations are characteristically fast-moving. Therefore, there is little or no opportunity for the Fire Support Teams supporting these forces to "dig in" for protection of their personnel and equipment. Recognizing the critical need for Fire Support Team mobility and protection, the Army has provided the Fire Support Team a Personnel Carrier when supporting these units. While the M13 Armored Personnel Carrier provides mobility to the Fire Support Team, it does not provide the needed protection to the Fire Support Team directing the fires of the supporting artillery when operating in the battle area. That shortcoming is the geneats for this program request; that is, to protect the Fire Support Teams and their equipment, especially the Ground Laser Locator Designator, while conducting lasing operations and directing fires. The easiest and most cost-effective way to accomplish this task is to develope for the Improved TOM Vehicle program. Since a handheld magnetic compass normally used by Fire Support Teams to obta

G. (U) RELATED ACTIVITIES: None.

H. (U) MORK PERFORMED BY: The overall in-house program responsibility lies with the Project Manager, Improved TOW Vehicle (ITV)/Fire Support Team, and the US Army Tank-Automotive Materiel Readiness Command (TARCOM), Warren, MI, with assistance from three other agencies: The US Army Communications Research and Development Command (CORADCOM), Ft Monmouth, NJ; the US Army Engineering Topographic Laboratories (ETL), Ft Belvoir, VA; and the US Army Missile Research and Development Command (MICOM), Huntsville, AL. The prime contractor for development is Emerson Electric, current producer of the Improved TOW Vehicle, located in St Louis, MO.

UNCLASSIFIED

Program Element: #6.46.26.A

DOD Mission Area: #211 - Close Combat

Title: Fire Support Team Vehicle (FISTV)
Budget Activity: 44 - Tactical Programs

I. (U) PROGRAM ACCOMPLISIMENTS AND PUTURE PROGRAMS:

- 1. (U) FY 1980 and Prior Accomplishments: The Project Officer was established at the Tank-Automotive Command with the Project Manager, Improved TOW Vehicle, as the responsible officer for this program. A contract for design and integration of the vehicle was awarded to Emerson Electric. A contract to design and modify engineering development Ground Laser Locator Designator with a remote operating capability was awarded to Hughes Aircraft Co. Bendix was selected as the subcontractor for development of the North-Seeking Gyro. The majority of the design effort was completed, and contractor testing of brassboard subsystems was initiated. A systems model was completed and began contractor testing.
- 2. (U) FY 1981 Program: More extensive contractor testing and Systems Model Testing will be completed using prototype subsystems. The first three prototype vehicles will be fabricated and tested by the contractor prior to Government acceptance planning and support, to include spares and draft technical manuals, will be completed to support Government Engineering Design Testing. A contract to remote six production GLLD's will be awarded.
- 3. (U) FY 1982 Planned Program: Engineering Design Testing will be completed. Correction of deficiencies and short-comings discovered during this testing will be incorporated into the first three prototype vehicles. These vehicles will be refurbished and upgraded for training and user operational testing. Three additional prototype vehicles will be fabricated for Government prototype qualification testing. All six prototype vehicles will be equipped with the remoted production Ground Laser Locator Designators. All planning and test support for operational and development testing will be initiated.
- 4. (U) FY 1983 Planned Program: Development and Operational testing will be completed. Reduction and analysis of test data, correction and redesign, and productbility and engineering planning will continue, culminating in a production decision in March 1983. The first production contract will be awarded. Technical publications and the Technical Data Package will be upgraded. Equipment used for testing will be refurbished to a "like new" condition.
 - 5. (U) Program to Completion: Complete production and fielding.

UNCLASSIFIED

11-459

No facilities and the account

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.28.A

DOD Mission Area: #212 - Fire Support

Title: Indirect Fire Training Munitions
Budget Activity: 4 - Tactical Programs

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

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND HISSION NEED: This program supports the engineering development of a new family of artillery and mortar training projectiles to meet the Army need of significantly reducing the cost of training ammunition while continuing to provide realistic training. The training rounds being developed in this program are full caliber projectiles that use pyrotechnic fuze spotting charges to provide training realism. The cost avoidance associated with substituting this new family of training ammunition for the standard high-explositive ammunition now being used is expected to exceed 25%. The Army will begin to realize this cost avoidance beginning in FY82; i.e., upon receipt of the FY81 procurement quantities.
- C. ,(U) BASIS FOR FY 1992 RDTE REQUEST: Completion of engineering development of the 8-inch artillery training projectile.
- D. (U) COMPARISON WITH FY 1981 RDTE REQUEST: (\$ in thousands)

	PY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
ROTE					
Funds (current requirements) Funds (as shown in FY 1981	1094	593	1368	Continuing	Not Applicable
submission)	1489	636	1307	0	Not Applicable

UNCLASSIFIED

Program Element: #6.46.28.A DOD Mission Area: #212 - Fire Support Title: Indirect Fire Training Munition:
Budget Activity: 44 - Tactical Programs

\$395 thousand in FY 1980 funds was reprogramed to higher priority Army requirements. The FY81 decrease is attributable to the application of general Congressional reductions.

The FY82 increase is the result of the amended budget request and the application of higher fuel, inflation, and civilian pay pricing indices than were applied the previous year.

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

	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	PY 1983 Estimate	Additional To Completion	Potal Estimated Cost
Ammunition Procurement, Army:						
Funds (current requirements)	0	12800	4)	0	Continuing	Not Applicable
Funds (as shown in FY 1981 submission)	0	13600	18400	Not Shown	Continuing	Not Applicable
Quantities (current requirements)						
XM804 155mm	0	15300	0	0	Continuing	Not Applicable
XM798 81mm	0	0	0	0	Continuing	lot Applicable
XM816 60 mm	0	0	0	0	Continuing	Not Applicable
Quantities (as shown in FY 1981 submission)						
XM804 155mm	0	153000	101000	Not Shown	Continuing	dot Applicable
XM798 81mm	0	8000	115000	Not Shown	Continuing	fot Applicable
хм816 60тт	0	. 0	26000	Not Shown	Continuing	Not Applicable

UNCLASSIFIED

11-461

Artherina Hammer

Program Element: 16.36.28.A

DOD Mission Area: 1212 - Fire Support

Title: Inditect Fire Training Munitions
Budget Activity: 4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program supports development of a new family of artillery and mortar training projectiles which will significantly reduce the cost of amountion for training purposes and improve the methods of training artillery and mortar crews. Exploratory development efforts demonstrated that low-cost training projectiles can be developed to provide gunner and forward observer training at a cost substantially less than present HE projectiles. The concept being pursued for mortar amountation is a plastic-jacketed projectile filled with concrete. This projectile provides the same exterior ballistics and will produce a signature for fire adjustment on impact. The mortar training rounds will use the standard fins and propellant ignition system used with high-explosive (HE) rounds, but the conventional fuze will be replaced with a pyrotechnic spotting charge that provides realistic flash, smoke, and noise to train observer personnel. The eight-inch and 155mm artillery projectiles will use thick-walled, inert metal shells, which will be ballistically matched to the current high-explosive projectile. The munitions will be fired using standard propelling charges which will provide realistic training for field artillery units. Cost savings will be derived from reduced shell cost, fuze costs, and packaging costs.
- G. (U) RELATED ACTIVIFIES: This program is the normal engineering development program supporting advanced development of the artillery and morrar training projectiles conducted in program element 6.36.28.A, Field Artillery Ammunition.
- H. (U) WORK PERFORMED BY: US Army Armament Research and Development Command (ARRADCOM), Dover, NJ, ARRADCOM, Aberdeen, MD. To date the only work accomplished on contract was done by Chamberlain Manufacturing Corporation, Waterloo, IA. Other contractual effort will be accomplished upon selection of contractors from current Requests for Proposals.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Prior development in this program was conducted in program element 6.36.28.A, Pield Artillery Ammunition Development. Advanced development of the 155mm artillery projectile, XN804, and 81mm mortar cartridge M798 was initiated in PY 1977. In FY 1978 work was initiated on the 60mm mortar cartridge, XN816, applying technology gained in the 81mm effort. In FY79 sufficient quantities of 155mm, 60mm, and 81mm training ammunition were fabricated to satisfactorily demonstrate ballistic similitude and adequate target signature under most terrain conditions. Fuze and spotting signatures and low-cost packaging designs have been evaluated. Both artillery and mortar rounds have been fired for ballistic characterization, fuze suitability, and cartridge integrity. In FY80 sufficient quantities of 155mm artillery training projectiles were fabricated for engineering development testing, safety testing, and the conduct of development test and operational test II (DT/OT II). Development acceptance in-process reviews (DEVA IPR) and type classification action were conducted for the 155mm projectile, and a Technical Data Package (TDP) for production was completed. The previously sched-

UNCLASSIFIED

11~462

Program Element: #6.46.28.A

DOD Mission Area: #212 - Fire Support

Title: Indirect Pire Training Munition:
Budget Activity: 14 - Tactical Propries

uled initiation of Engineering Development for the 8", 60mm, and 81mm mortar rounds was rescheduled for PY81. This was necessitated by unexpectedly high costs of development for the 155mm round which exhausted available funds.

- 2. (U) FY 1981 Program: Engineering development of the 8" artillery training projectile XM844 aill be initiated. DT and OT II of the 60mm and the 81mm mortar training projectiles will be initiated.
- 3. (U) FY 1982 Planned Program: Complete DT/OT II for the 60mm and 81mm mortars and 8-inch artillery practice rounds. Complete engineering development and type classification of these training projectiles.
- 4. (U) FY 1983 Planned Program: Conduct DT/OT II for the 60mm XM840 one-tenth range and 81mm can tenth range mortar practice rounds.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

11-463

Astant Co.

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.30.A

DOD Mission Area: #211 - Close Combat

Title: Tank Gun Cooperative Development
Budget Activity: 4 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM BLEMENT QUANTITIES:	FY 1980 Actual 40226	FY 1981 Estimate 62061	FY 1982 <u>Estimate</u> 84567	FY 1983 Estimate 54219	Additional to Completion 287	Total Estimated Cost 287260
	Ammunition Rounds Cannon (Tube and Breech) Spare Tubes						30770 22 43
D060	120mm Gun Development	3000	3010	2971	1388	0	23567
D064	120mm Tank Gun Ammo						
	Development	18500	19207	19539	10450	287	82183
D287	Tank Gun Integration	19726	39844	62057	42381	0	181608

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program provides for the technology transfer, fabrication, and testing (TTF&T), and adaptation of the Federal Republic of Germany (GE) 120mm smoothbore tank gun system to US manufacturing methods, development of improvements to this system, and integration of the system into the XM1 tank. The 120mm gun-equipped XM1 tank has been designated as the XM1E1 tank. This program is required to assure the availability of a future tank main armament system for the XM1 tank to defeat the postulated tank threat equipped with more advanced armor of the late 1980's and beyond and to maintain a high degree of interoperability with the NATO tank fleets equipped with the Leopard 2 tank.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Testing of the 120mm gun tube and breech will be completed. With the exception of the modern technology kinetic energy round and the kinetic energy training round, the ammunition systems contractor will complete final design testing of the ammunition family, and hardware fabrication for ammunition development testing (DT II) will be completed. Development and testing of the modern technology kinetic energy round will continue. Pabrication of ammunition, cannon, four XMIEI tanks, and necessary supporting hardware for development and operational testing will be completed. The major emphasis of FY82 will be the initiation and conduct of Development Test II (March 1982) and the preparation for the

UNCLASSIFIED

Program Element: #6.46.30.A

DOD Mission Area: #211 - Close Combat

Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

Operational Test II. Contractor activity, including systems engineering, system logistics work, producibility, engineering, and planning (PEP) for all US-produced hardware, will continue.

	Current	Milestone Dates
Major Milestones	Milestone Dates	Shown in FY 1981 Submission
Tank Main Armament		
Decision	2Q₽¥78	2Q₽¥78
Start US Development/		
Integration of 120mm		
Gun System	2QFY79	2QFY79
Complete XM1El		
Tank System Development		
and Operational		
Testing (DT/OT II)	2QFY83	4QFY82
Convene Defense Systems		
Acquisition Review		
Council (DSARC III)	3QFY83	3QFY83
First Production		•
Delivery of XMIEL Tank	4QPY84	4QFY84

The Development and Operational II test completion date has been slipped to 20 PY 1983 to insure that sufficient 120mm training ammunition rounds are available to support the operational test of the XMIEI tank system. The delay has been caused by problems encountered during the technical translation of the German ammunition design.

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

. (0)	ROTE	PY 1980	PY 1981	FY 1982	Additional To Completion	Total Batimated Cost
	Funds (current requirements)	40226	62061	84567	54 506	28/260
	Funds (as shown in FY 1981 submission)	42069	61492	49303	22820	221584

UNCLASSIFIED

11-465

Wilder and Bloom in the contract

Program Element: #6.46.30.A DOD Mission Area: #211 - Close Combat Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

The current submission (Total Estimated Cost) incorporates a reduction from an PY 1980 Army reprograming action (\$1.99 million) and an increase of \$63.5 million in PY 1982 (\$33.5M) and PY 1983 (\$30.04) in the D287 Tank Gun Integration portion of the program. The cost growth can be ascribed to a substantial increase in work scope associated with logistical development costs of XMIEL tank-peculiar hardware and a sizable increase in the magnitude of the number and complexity of tank system-related hardware changes required to integrate the 120mm weapons systems into the XML tank. \$7.4 million of TRACE funds has been added in FY 1983. The additional variations of \$4 million from the FY 1981 submission are the result of escalation and minor program adjustments. There is significant risk in attaining the OSD-mandated first-production delivery date of August 1984 because of lack of flexibility in the overall program schedule.

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

	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Weapons and Tracked Combat Vehicles	s, Army					
Funds (current requirements)	Ó	ŋ	12100	6100	0	18200
Funds (as shown in FY 1981						
submission)	9	0	13700	0	0	13700
Ammunition Procurement, Army						
Funds (current requirements)	15000	3988	15000	189400	1032300	Cont. Inuing
Funds (as shown in FY 1981						
submission)	15000	3900	19867	Not Shown	367200	Con: Inuing
Quantities (current requirements)	0	0	0	62000	795000	Cont Inuing
Quantities (as shown in PY 1981	0	O	0	Not Sh	own 175000	Cont Inuing

Differences under "Weapons and Tracked Combat Vehicles" reflect a realignment of the funds required for 120nm gun facilitization at Watervilet Arsenal and for XMIE1 system facilitization of Detroit Arsenal Tank Plant and Lima Army Tank Plant. The total facilitization amount has increased over the FY 1981 submission by \$4.5 million due to increased special tool

UNCLASSIFIED

Program Element: 16.46.30.A

DOD Mission Area: 1211 - Close Combat

Title: Tank Gun Cooperative Development
Budget Activity: 4 - Tactical Programs

requirements. Funds and quantities shown under "Ammunition Procurement" reflect the continuing amountion requirement and associated procurement costs necessary to support fielding and operation of the XMIEL tank system. The PY 1981 and "additional to completion" funds are for the facilitization of ammunition production facilities and procurement of service and training ammunition to support the August 1984 XMIEL first production delivery date. The "Total Estimated Cost" is not shown in recognition of continuing ammunition requirements, both to meet the Authorized Acquisition Objective (AAO) and for training.

UNCLASSIFIED

11-467

Manual Stranger

Program Element: #6.46.30.A

DOD Mission Area: #211 - Close Combat

Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

ιĹ

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: This program is an outgrowth of the 1975 Tripartite (United States, United Kingdom, and Federal Republic of Germany US, UK, and GE) Tank Main Armament Evaluation to determine an optimum future tank main armament system, a continuing analysis of future armor threats and recognition of NATO harmonization/standardization efforts. This Program Element consists of three projects, D060 120mm Tank Gun Development, D064 120mm Tank Gun Ammunition Development, and D287 Tank Gun Integration, and was originally established in response to Congressional guidance which specified that testing and evaluation of alternative 120mm gun systems would be conducted as a parallel program, separate and apart from the funding of the XM1 program. Evaluation of alternative tank main armament systems was completed in December 1977 and on 31 January 1978, the Army formally announced the selection of the GE 120mm smoothbore gun system for adaptation to US manuficturing methods and future incorporation into the XM1 tank. The objectives of this program include translation and adaptation of GE technology to US manufacturing methods, verification and certification of US-produced hardware, development of a new modern technology Armor-Piercing, Fin-Stablitzed Discarding-Sabot Tracer (APFSDS-T) kinetic energy round, development of a range limited kinetic energy training round, and integration of the 120mm smoothbore gun system into the XM1 to ment the postulated tank threat equipped with more advanced armor of the late 1980's and beyond.
- G. (U) <u>RELATED ACTIVITIES</u>: This program is related to Program Element (PE) 6.46.20.A, Tank XMI, and is dependent upon technology developed under PE 6.26.18.A, Ballistic Technology and PE 6.26.03.A, Large Caliber and Nuclear Technology. Program activities are fully coordinated to assure no unnecessary duplication of effort, either within the Army or other Department of Defense agencies.
- H. (U) WORK PERFORMED BY: Chrysler Defense Incorporated, Warren, MI; US Army Armament Research and Development Command, Dover, NJ; US Army Test and Evaluation Command, Aberdeen, MD; US Army Operational Test and Evaluation Agency, Falls Church, VA; Rheinmetall Limited, Dusseldorf, Germany; and Honeywell Inc., Nopkins, MN.
- I. (U) PROGRAM ACCOMPLISIMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Pollowing extensive evaluations of UK, US, and GE candidate tank main armament systems spanning the period 1973 through 1977, in January 1978, the Army selected the GE 120mm smoothbore gun system for continued US development and future incorporation into the XM1 tank. An Army Systems Acquisition Review Council (ASARC) convened in April 1978 and approved a 120mm gun program leading to first production delivery of a 120mm gun XM1 (XMIEI) tank in August 1984, and the Office of the Secretary of Defense concurred. Program initiation, however, was delayed pending a satisfactory license agreement with the GE developer, Rheinmetall, for US production of the 120mm systems. The program was initiated in March 1979 following the February 1979 signing of the license agreement. A special ASARC in March 1979 approved

UNCLASSIFIED

Program Element: #6.46.30.A DOD Mission Ares: #211 - Close Combat Title: Tank Gun Cooperative Development
Budget Activity: 4 - Tactical Programs

a revised program leading to an August 1985 first production delivery. OSD, however, did not concur with the proposed one-year slip, directing instead that the Army continue planning for first delivery in August 1984. Initial deliveries of technical data and hardware were received from GE in accordance with the license agreement and a hardware contract awarded to GE in July 1979. Systems contracts were awarded to Chrysler Corporation in June 1979 for the validation phase of the systems integration effort and to Honeywell Incorporated in August 1979 for the Technology Transfer, Fabrication and Test of the GE family of ammunition. A US/GE joint feasibility demonstration program for a modern technology kinetic energy round was completed in July 1979. The 120mm gun-equipped XMI was designated the XMIEI tank, and system integration and test efforts continued. As the result of a 120mm breech design decision review in October 1979, the GE design was selected for adaptation to US production methods and integration into the XMIEI tank system. Technology transfer, fabrication, and test efforts continued with fabrication of tubes and breeches and initiation of dynamic and verification firing tests. Initial US tubes and breeches for subsequent gun, ammunition and tank system testing were fabricated with the first US-produced gun (tube and breech) delivered from Watervillet Arsenal on schedule. Test quantities of ammunition were fabricated and tested to assure conformance with GE technical data packages and performance requirements determined to obtain a safety release of hardware required for XMIEI tank system tests. Developmental work on the modern technology Armor-Piercing, Flu-Stabilized, Discarding-Sabot Tracer (APFSDS-T) kinetic energy round (XM829) and a kinetic energy training round (XM832) was initiated. System integration activities continued with the development of hardware and software necessary to integrate the larger gun system into the XMI tank and assure fightability and survivability comparable to that of t

2. (U) PY 1981 Program: Dynamic testing of US-fabricated tubes and breeches will continue, and verification firing tests will be completed. Hardware required for XM181 system testing will be fabricated. Validation testing of US-fabricated ammunition will continue concurrent with testing of the German-produced ammunition to assure interoperability of designs. The modern technology kinetic energy round (XM829) will continue in engineering design with various designs being fabricated and tested to optimize penetration and accuracy performance. A kinetic energy training round (XM832) also will continue in engineering design and undergo testing to determine range-limiting capability and dispersion data. Two Xiii tanks are being converted to the XM181 configuration for contractor testing and PT/ME and those tests conducted. Fabrication of hardware and assembly of four XM181 tanks for DT/OT II will be initiated as will procurement of necessary guns and ammunition to support these tests. Planning and preparation for DT/OT II will continue.

UNCLASSIFIED

11-469

CAR I destructed the according to the

Program Element: #6.46.30.A

DOD Mission Area: #211 - Close Combat

Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

- 3. (U) FY 1982 Planned Program: Testing of the 120mm gun tube and breech will be completed. With the exception of the modern technology kinetic energy round and kinetic energy training round, the ammunition systems contractor will complete final design testing of the ammunition family, fabricate hardware for ammunition development testing (DT II) and initiate DT II. Development and testing of the modern technology kinetic energy round and kinetic energy training round will continue. Pabrication of ammunition, cannon, six XMIEI tanks and necessary supporting hardware for development and operational testing will be completed, and DT/OT II will be initiated. Contractor activity, including system engineering, systems logistics work, producibility, engineering, and planning (PEP) for all US-produced hardware, will continue.
- 4. (U) FY 1983 Planned Program: The 120mm gun, ammunition, and tank system testing will be completed and data compiled in preparation for a June 1983 Defense Systems Acquisition Review Council (DSARC) production decision. XHIEL tank systems DT/OT II and System Interchangeability testing will be completed. Producibility, Engineering, and Planning (PEP) and technical data packages will be completed and the six XMIEL tanks used for testing will be refurbished to a "like new" condition. The modern technology kinetic energy round will begin developmental testing. Current plans envision initial production delivery of XMIEL tanks in FY 1984.
- 5. (U) Program to Completion: The Development Test (DT II) of the XM829 modern technology kinetic energy round will be completed and type classified in FY 1984.

UNCLASSIFIED

FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #D064
Program Element: #6.46.30.A
DOD Mission Area: #211 - Close Combat

Title: 120mm Tank Gun Ammo Development
Title: Tank Gun Cooperative Development
Budget Activity: 4 - Tactical Program

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: This program implements the Army decision of January 1978 to select the German 120mm smoothbore gun system for future incorporation on the XMI Tank to meet the armor threat of the mid-1980's and beyond. This project concentrates on translating, developing, testing, and qualifying a five-round family of 120mm ammunition consisting of: a German Armor-Piercing, Fin-Stabilized, Discarding Sabot, Tracer round (APFSDS-T) (XM627) modified with a US-designed staballoy penetrator; a modern technology APFSDS-T round (mod Tech APFSDS-T) (XM629); a High-Explosive Antitank Multipurpose Tracer round (HEAT-MP-T)(XM830); and two Training rounds. The training rounds are: an Armor-Piercing Pin-Stabilized Discarding Sabot, Target Practice round (APFSDS-TP)(XM632); and a High-Explosive Antitank Target Practice round (AEAT-TP)(XM831) for use with the 120mm-equipped XMI Tank. These training rounds are necessary to meet range safety limitations and to reduce training costs. The XM827, XM830, and XM831 cartridges will be translated from the German designs. The XM829 will be a new development of US design. German development of the XM822 will be monitored to determine if the projectile will meet US requirements for accuracy; if not, a US design for this round will be pursued.
- B. (U) RELATED ACTIVITIES: This project is related to Program Element (PE) 6.46.20.A, Tank XM1; PE 6.46.30.A, Tank Gun Cooperative Development, Projects D060-120mm Tank Gun Development and D287-Tank Gun Integration, and is dependent upon technology developed under PE 6.26.18.A, Ballistics Technology, and 6.26.03.A, Large Caliber and Nuclear Technology. Duplication of effort is avoided through centralized management by Project Manager, Tank Main Armament Systems.
- C. (U) WORK PERFORMED BY: US Army Armament Research and Development Command, Dover, NJ; the US Army Test and Evaluation Command, Aberdeen, MD; Rhinemetall Corporation, Dusseldorf, GE, and Honeywall, Inc., Hopkins, MN.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: The program was initiated in Pebruary 1979 when a license agreement was signed with the German developer, Rheinmetall. Subsequently, initial deliveries of technical data were received from Germany, and a system contract for technology transfer, kabrication, and test (TTP&T) of the German assumition family was granted to Honeywell, Inc. A Joint US/German Feasibility Bemonstration of the Modern Technology APFSDS-T (XM829) round was conducted. However, initiation of a codevelopment program (or this cartridge was not approved by the German government. Initial tests of US-produced propellant and the XM827 staballoy penetrator were conducted. The fuzz design program for the XM830 HRAT-MP round was begun and improved sabot and penetrator designs for the Modern Tech XM829 cartridge were tested. Initial firings of the US design for the XM832 were conducted, and monitoring of GE design testing continued.

UNCLASSIFIED

11-471

Anthony of the

Project: #D064
Program Element: #6.46.30.A
DOD Mission Area: #211 - Close Combat

Title: 120mm Tank Gun Ammo Development
Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

- 2. (U) FY 1981 Program: Fabrication and testing of APPSDS-T XM827, HEAT-MP-T XM830, and HEAT-TP XM331 cartridges will continue with fabrication of Development Test II hardware. The Modern Technology APPSDS-T XM829 cartridge: will continue in the engineering design phase with hardware being fabricated and the selected designs subjected to a series of armor penetration and accuracy tests. The APPSDS-TP XM832 round will continue in ED. Hardware will be fabricated and the selected design will be subjected to maximum range and dispersion tests. A Producibility Engineering and Planning (PEP) effort will be initiated and hardware tested to evaluate producibility of all rounds.
- 3. (U) FY 1982 Planned Program: The system contractor (Honeywell) will complete the final testing of the design selected for APFSDS-T XM827, HEAT-MP-T XM830, and HEAT-TP XM831 cartridges, complete fabrication of DT II hardware, and initiate DT II. The APFSDS-TP XM832 program will continue with a series of development tests. DT II hardware will be fabricated, and the saf-ty phase of DT II will be conducted to obtain safety release of hardware for the XMLEI Tank System tests. Hardware will be fabricated and testing of the APPSDS-T XM829 will be conducted to confirm and freeze the design.
- 4. (U) PY 1933 Planned Program: DT II tests will be completed for the APPSDS-T XM827, HEAT-MP-T XM330, HEAT-TP XM831, and APPSDS-TP XM832 Alth type classification scheduled for 3QFY83. Hardware for DT II of the Mod Tech APPSDS-T XM829 will be fabricated, and the DT II will be conducted.
- 5. (U) Program to Completion: DT II of the Mod Tech APFSOS-T XH829 will be completed and the round type classified in the 198784.

6. (U) Major Milestones:

Major Milestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
APFSD3-F XHB27		
Type :lassification	3Q83	3Q83
Mod Tech APFSDS-T XM829	_	
Type Classification	1084	1Q84
HEAT-(P-T XM330		
Type Classification	^{3Q83} UNCLASSIFIED	3Q83

Project: #D064
Program Element: #6.46.30.A
DOD Mission Area: #211 - Close Combat Title: 120mm Tank Gun Anno Development
Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs Current Milestone Dates Major Milestones HEAT-TP XM831 Milestone Dates Shown in FY 1981 Submission Type Classification 3Q83 3083 APFSDS-TP XM832 Type Classification 3Q83 3Q83 7. (U) Resources (\$ in thousands): Total FY 1980 FY 1981 FY 1982 PY 1983 Additional Estimated Actual Estimate Estimate Estimate to Completion Cost ROTE Funds (current requirements) 18500 Funds (as shown in FY 1981 19207 19539 10450 287 82183 submission) 18544 19026 19986 Not Shown 10199 82231 Quantities (current requirements) APFSDS-T (Rounds)
Mod Tech APPSDS-T (Rounds)
HEAT-MP-T (Rounds)
HEAT-TP (Rounds) 1570 2850 3925 766 APPSDS-TP (Rounds) 1446 Quantities (as shown in FY 1981 submission) APPSDS-T (Rounds) 1570

UNCLASSIFIED

11-473

of the land and think is not to be

Project: #D064
Program Element: #6.46.30.A
DOD Mission Area: #211 - Close Combat

Title: 120mm Tank Gun Ammo Development
Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

Mod Tech APFSDS-T (Rounds) HEAT-MP-T (Rounds) HEAT-TP (Rounds) APFSDS-TP (Rounds)	FY 1990 Actual	FY 1931 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Estimated Cost 2850 3925 766 1446
--	-------------------	---------------------	---------------------	---------------------	-----------------------------	--

The minor variations from the FY 1981 submission are the result of adjustments made for changes in escalution.

Other Appropriation Funds (\$ in thousands)

	FY 1980 Actual	FY 1931 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional to Completion	Total Estimated Cost
Procurement Ammunition, Army Funds (current requirements)	15000- <u>l</u>	1798 ²	15000 ³	189400 ⁴	10323005	Continuing Total
Funds (as shown in FY 1981 submission)	15000	3900	19367	Not Shown	367200	Contluding
Quantities (current require	ements)			62000	796000 ⁵	Continuing
Quantities (as shown in FY	1981 submi	ssion)		Not Shown	175000	Continuing

^{1/} FY 1980 funds are for initial payment of licensing fees.

UNCLASSIFIED

^{2/ 1981} funds are for Manufacturing Methods and Technology (MIST).

Project: #D064
Program Element: #6.46.30.A
DOD Mission Area: #211 - Close Combat

Title: 120mm Tank Gun Ammo Development
Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

- 3/ FY 1982 estimate is for final payment of licencing fees.
- 4/ The PY 1983 funds are for initial facilitization of ammunition production facilities (\$93.8M) and procurement of service (\$37.6M) and training (\$36.7M) ammunition to support fielding of the XHIEL tank system. \$21.3M is for procurement of overseas components to insure available annuunition to support the mandated August 1984 XHIEL first delivery.
- 5/ Funding for completion includes \$77.9M to complete ammunition production facilities capable of producing both 105mm and 120mm tank ammunition. Also included are \$230.2M for service ammunition and \$724.2M for training ammunition procurement. These figures have increased primarily due to the addition of training ammunition which was not included in last year's submission because requirements had not been established.

UNCLASSIFIED

11-475

No backward D. A. a.

PY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Project: #0287
Program Element: #6.46.30.A
DOD Mission Area: #211 - Close Combat

Title: Tank Gun Integration
Title: Tank Gun Cooperative Development
Budget Activity: 54 - Tactical Programs

- A. (U) DETAILED BACKGROUND AND DESCRIPTION: This program is an outgrowth of the 1975 Tripartite (United States, United Kingdom, and Federal Republic of Germany US, UK, and GE) Tank Main Armament Evaluation, a continuing analysis of future armor threats and recognition of NATO harmonization/standardization efforts. Comprehensive testing and evaluation of candidate tank main armament systems (US 105mm rifled bore, UK 120mm rifled bore and GE 120mm smoothbore) continued through December 1977, to determine the best follow-on main armament system for the XM1 tank. This program implements the Army decision of January 1978 to select the GE 120mm smoothbore tank gun system for future incorporation on the XM1 tank to meet the threat of the late-1980's and beyond. This project will concentrate on developing, testing, and qualifying XM1 tank subsystems, i.e., gun mount, turret, and automotive subsystems, and ammunition storage compartments, necessary to integrate the 120mm gun system into the XM1 while maintaining the survivability and fightability of the tank system. In August 1979, the 120mm gun XM1 tank was officially designated the XM1EI tank.
- 8. (U) RELATED ACTIVITIES: This program is related to Program Element (PE) 6.46.20.A, Tank XM1; PE 6.46.30.A, Tank Gun Cooperative Development, Project D060 120mm Tank Gun Development, and D064 120mm Tank Gun Ammunition, and is dependent upon technology developed under PE 6.26.18.A, Ballistics Technology, and PE 6.26.03.A, Large Caliber and Nuclear Technology. All program activities are fully coordinated to assure no unnecessary duplication of effort, either within the Army or other Department of Defense agencies.
- C. (U) WORK PERFORMED BY: Chrysler Defense Incorporated, Warren, MI; the US Army Armament Research and Development Command, Bover, NJ; US Army Test and Evaluation Command, Aberdeen, MD; and the US Army Operational Test and Evaluation Agency, Falls Church, VA.
- D. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Following the 22 February 1979 signing of a 120mm gun system licensing agreement with the CE developer, Rheinmetall, the US integration program officially commenced on 8 March 1979. A systems contract was awarded to Chrysler Corporation on 1 June 1979 to initiate concept/feasibility studies for integration of the 120mm gun system into the XMI tank and the 120mm gun XMI tank was designated the XMIEL. System engineering and design activities were initiated in the areas of 120mm weapon system/vehicle interface, gun mount/recoil system, fire control and bal-

UNCLASSIFIED

Project: #D287

Program Element: #6.46.30.A

DOD Mission Area: #211 - Close Combat

Title: Tank Gun Integration

Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

listic protection. Detailed system design analysis for all affected XMIEI system/subsystem components has been conducted, and procurement and fabrication of hardware and assemblies necessary to convert two XMI tanks XMIEI-configured tanks have been completed. A full-scale engineering development letter contract has been awarded to Chrysler Defense Inc, and contractor activity in the areas of armor development, ammunition compartmentalization, fire control, system integration-engineering, logistics, product assurance, human factors, value engineering, productbility engineering and planning (PEP), safety and life cycle costing has begun. Pabrication of two XMIEI tanks for contractor testing and Physical Teardown/Maintenance Evaluation (PT/ME) has been initiated as will procurement of system hardware for development and operational testing (DT/OT II). Pormal test planning for DT/OT II and follow-on XMIEI system interoperability tests has con-

ŗ

- 2. (U) FY 1981 Program: Conversion of two XMI tanks (less 105mm components) to the XMIEI configuration will be completed. Contractor tests and PT/ME will be conducted to assess ammunition storage, weapons and fire control performance, and other related system integration factors (fightability, safety, and overall system performance) and conformance to specifications. Fabrication and assembly of four XMIEI pilot tanks for DT/OT II, incorporating system changes resulting from contractor tests and related system development activities, will be initiated. Procurement of necessary 120mm cannon, ammunition, and system hardware and software to support ongoing and pending contractor and government test programs will continue. System-related activities in such areas as system engineering, quality assurance, logistics, PEP, value engineering, costing, and scheduling will continue as will planning and preparation for conduct of DT/OT II.
- 3. (U) FY 1982 Planned Program: Procurement and fabrication of the necessary hardware will be completed to convert four XMI tanks to XMIEI configuration. The major emphasis of FY82 will be the initiation and conduct of Development Test II (March 1982) and the preparation for the initiation of Operational Test II in October 1982. Contractor activities including system engineering, configuration management, integrated logistics support, PEP, and safety will continue.
- 4. (U) FY 1983 Planned Program: DT/OT II will be completed during the second quarter, and US interchangeability testing will be initiated. A system confirmatory test using the XM832 kinetic energy training round will be conducted. The six XM181 tanks required for testing will be refurbished to a "like new" condition, and contractor activities, including PEP and preparation of the XM181 technical data package, will be completed. A Defense Systems Acquisition Review Council (DSARC III) production decision is envisioned in June, 1983 with first production delivery of an XM181 tank planned for 4QFY1984.

UNCLASSIFIED

11-477

Acidemical Control

Project: #D287
Program Element: #6.46.30.A
DOD Mission Area: #211 - Close Combat

Title: Tank Gun Integration
Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

5. (U) Major Milestones:

Major Hilestones	Current Milestone Dates	Milestone Dates Shown in FY 1981 Submission
Initiate integration of 120mm gun into XMI tank	2 0 FY79	2QFY79
Equip two XM1 tanks to 120mm configuration for Contractor testing and physical teardown/		
maintenance evaluation Equip four XML production tanks	PY81	FY81
with 120mm system for DT/OT II Complete 120mm gun XMI tank	FY82	FY82
system DT/OT II First Production Delivery	2Q FY83	FY82
of XMIRI Tank	4QPY84	Not Shown

The DT/OT II completion date has been slipped to 20PY83 to insure that sufficient US-produced, 120mm training ammunition is available to support the operational test of the XMIEI tank system. The delay has been caused by problems encountered during the technical translation of the German ammunition design.

UNCLASSIFIED

Project: #D287
Program Element: #6.46.30.A
DOD Mission Area: #211 - Glose Combat

Title: Tank Gun Integration
Title: Tank Gun Cooperative Development
Budget Activity: 14 - Tactical Programs

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

	FY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	PY 1983 Estimate	Additional to Completion	Total Estimated Cost
DTE						
Punds (current requirements)	18726	39844	62057	42381	0	18160 8
Funds (as shown in PY 1981	00704	20101			_	
submission)	20725	39484	26466	11015	0	116290
Quantities (current requireme	ents)					
Ammunition (approximate)						17000
Cannon (Tube and	*					
Breech)						LO .
Spare Tubes						25
Quantities (as shown in FY 19	81					
submission)						
Ammunition						18200
Cannon (Tube and						
Breech)						12
Spare Tubes						26
Other Appropriations:						
Weapons and Tracked Combat						
Vehicles, Army						
Funds (current						
requirements)	0	0	4700	6100	0	10800
Funds (as shown in FY l	981					
submission)			None Sh	OWD		
				** **		

UNCLASSIFIED

I1-479

Project: #D287

Program Element: #6.46.30.A

DOD Mission Area: #211 - Close Combat

Title: Tank Gun Integration
Title: Tank Gun Cooperative Levelopment
Budget Activity: 44 - Tactical Programs

The current RDTE submission (Total Estimated Cost) incorporates a reduction in FY 1980 funds of \$1.99 million (Army reprogram action) and an increase of \$63.5 million in FY 1992 (\$33.5M) and FY 1983 (\$3.0M) in the system integration program costs. The cost growth can be ascribed to a substantial increase in work scope associated with logistical development costs of XMIEI tank-peculiar hardware and a sizeable increase in the magnitude of the number and complexity of tank system-relaced hardware changes required to integrate the 120mm weapons systems into the XMI tank. \$7.4 million of TRACE funds has been added to the FY 1983 increase. The additional variations of \$3.8 million from the FY 1981 RDTE submission are the result of escalation. The additional \$6.1 million under "other appropriations" is required for additional facilitization of Lima Army Tank Plant and Detroit Arsenal Tank Plant to produce the XMIEI tank and was not specifically identified as 120mm gun-related during the FY 1981 budget submission. There is significant risk in attaining the OSD-mandated first-production delivery date of August 1984 because of lack of flexibility in the overall program schedule.

UNCLASSIFIED

PY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.31.A

DOD Mission Area: #211 - Close Combat

Title: Pield Artillery Ammunition, 155mm Budget Activity: 34 - Tactical Programs

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT QUANTITIES	PY 1980 Actual 5671 (Not fe	FY 1981 Estimate 1693 asible to lis	FY 1982 Estimate 1483 t due to num	FY 1983 Estimate 7101 iber of dive	Additional To Completion Continuing rae items)	Total Estimated Costs Not Applicable
D175	Field Artillery Fuzes	0	0	0	0	Continuing	Not Applicable
D286	Pield Artillery Ammo (NATO)	309	377	522	837	Continuin	Not Applicable
D373	Ammo Cannon, 155mm	5362	1316	961	0	0	Not Applicable
D369	SADARM	0	0	0	6264	0	Not Applicable

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: This program supports development of 155mm field Artillery Ammunition to provide increased lethality, range, accuracy, reliability, and speed in delivering fires required to offset the numerical advantage of the Warsaw Pact Forces. This program also provides for compatibility testing of US Ammunition in NATO country howitzers and NATO ammunition in US howitzers, engineering development of new indirect fire fuzes, and for the engineering development (ED) of the new Sense and Destroy Armor Munition (SADARM), which is expected to enter ED in FY83.
- C. (U) BASIS FOR FY 1982 RDTE REQUEST: Funds requested provide for: Continuation of engineering development of the new 155mm XM825 WP Smoke projectile for type classification. Continued evaluation and testing of the criticeral (United Kingdom, Germany, Italy) nations' newly developed 155mm projectiles and propelling charges with US 155mm howitzers.

UNCLASSIFIED

11-481

All lands of the colors

Program Element: #6.46.31.A

DOD Mission Area: #211 - Close Combat

Title: Field Artillery Amounition, 155am
Budget Activity: 44 - Tactical Programs

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

	FY 1980	FY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements)	5671	1693	1483	Continuing	Not Applicable
Funds (as shown in FY 1981) submission)	7657	1821	3330	Continuing	Not Applicable

FY 1980 funds were reduced as a result of decreased funding requirements in project D286 which resulted from increased cooperation among the Trilateral Nationa, which reduced testing requirements, and a successful fix to the M509 eight-inch dual-purpose improved conventional munition, which obviated the requirement for RTDE expenditures in project D369. The decrease in FY81 is attributable to the application of general Congressional reductions. The reduction in FY82 results in the delay of projected initiation of Engineering Development of a follow-on electronic time fuze in project D175.

UNCLASSIFIED

Program Element: # #6.46.31.A

DOD Mission Area: #211 - Close Combat

Title: Pield Artillery Ammunition, 155mm Budget Activity: 44 - Tactical Programs

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

	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	FY 1983 Estimate	Additional To Completion	Total Estimated Cost
Ammunition Procurement, Army:						
Funds (current requirements) Funds (as shown in FY 1981)	12900	18500	15000	17300	Continuing	Not Applicable
submission)	9900	27500	67700	Not Shown	Continuing	Not Applicable
Quantities (current requirements)	79	80	81	82	Continuing	Not Applicable
H203	66	95	60	42	Continuing	Not Applicable
M211	0	0	0	0	Continuing	Not Applicable
Quantities (as shown in PY 1981 submission) (in thousands)						
M203	59	163	126	Not Shown	Continuing	Not Applicable
XM211	3	0	714	Not shown	Continuing	Not Applicable

Significant changes in procurement dollars and quantities in each fiscal year result from the determination that the M203 charge cannot be used with the M109 series self-propelled howitzers and the consequent complete realignment of the Army's procurement profile. The deletion of the projected procurement of the XM211 propelling charge is consistent with the Army's decision to terminate the development program for this item.

UNCLASSIFIED

11-483

All landers and the second of the second



Program Element: # #6.46.31.A

DOD Mission Area: #211 - Close Combat

Title: Pield Artillery Amounition, 155mm
Budget Activity: #4 - Tactical Programs

- F. (U) DETAILED BACKGROUND AND DESCRIPTION: A requirement exists to increase the indirect fire capability of field artillery cannon units by providing improved amountion. The XM795 projectile is ballistically similar to the cargo optimized family of projectiles (M483A1, ICM; M692/M718 mines) and uses high-fragmenting steel to provide significantly increased lethality and, when fired with the M203 propelling charge, has a 23% range increase over the standard high-explosive projectile. The projectiles are in agreement with ballistic parameters contained in a Memorandum of Understanding (M0U) signed in 1978 between the United States and three European nations, Germany, Italy, and the United Kingdom. Project D286 provides for compatibility testing of newly deviceped NATO weapons and municions with US howitzers and amountion. The trilateral nations (United Kingdom, Germany, Italy) have developed the FH70, towed 155mm Howitzer, a new family of propelling charges, and a new high-explosive projectile, the L25. All of these items are in agreement with the ballistic parameters in the MOU mentioned above. Testing to demonstrate compatibility/interchangeability began in FY 1979 consistent with availability of test Items. Projects D175 and D369 provide for the Engineering Development of follow-on indirect fire munitions fuzes and the Sense and Destroy Armor Munition (SADARM) respectively.
- G. (U) RELATED ACTIVITIES: This program which was previously accomplished under Program Element #6.46.14.A, Field Artillery Weapons and Amaunition, 155mm (prior to FY 1981), is the normal engineering development program for advanced development that has been in Program Element 6.36.28.A, Field Artillery Amaunition, and is dependent upon technology developed under Program Element 6.26.03.A, Large Caliber and Nuclear Technology. Cooperative agreements exist with NATO nations on the characteristics of 155mm Howitzers to include the requirement for amaunition interchangeability. A NATO panel has been constituted to insure that duplication of effort is avoided.
- H. (U) WORK PERFORMED BY: United States Army Armament Research and Development Command (ARRADCOM), Dover, NJ, Aberdeen, MD; and Yuma Proving Ground, Yuma, AZ. Contractors on the M198 Howitzer production are: Consolidated Diesel Electric Company, Old Greenwich, CT; and Numax Electronics, Incorporated, Hauppauge, Long Island, NY.
- I. (U) PROGRAM ACCOMPLISHMENTS AND FUTURE PROGRAMS:
- 1. (U) FY 1980 and Prior Accomplishments: Engineering development was initiated for a new family of 155mm propeiling charges (XM211 low zones, XM201 intermediate zones, M203 maximum zones) for the M198 and M109Al Howitzers. The M203 charge was type classified in FY 1977 with the M198 Howitzer and was tested for compatibility with the M109Al and found to be incompatible. In FY78 the XM201 charge development program was suspended as a result of the charge's inability to meet cannon tube wear constraints. In the interim, the XM211 charge was modified to provide intermediate zone capability. In FY80 the XM211 charge development was terminated as a result of the design being incompatible with automatic loading hardware and a reorientation of priorities. Advanced development of the XM795 HE cargo optimized projectile was initiated in FY76. A

UNCLASSIFIED

Program Element: #6.46.31.A

DOD Mission Area: #211 - Close Combat

Title: Pield Artillery Ammunition, 155mm
Budget Activity: #4 - Tactical Programs

validation in-process review (VAL-IPR) was conducted in FY 1978 and the XM795 entered engineering development. Initial development and operational tests (DT/OT I) were conducted in FY 1978 on two competitive smoke projectile designs, and the XM825 was selected for continued development. Engineering Development on the XM795 HE projectile continued. The Advanced Development program on the XM825 WP Smoke Projectile was completed, and a Validation IPR held in December 1978 approved entry into Engineering Development. In FY79 static tests on the XM825 were conducted at the Chemical Systems Laboratory, Edgewood Arsenal, MD, and ballistic testing with the XM203 propelling charge was accomplished at Dugway Proving Ground, UT. In Project D286 in FY79, UK charges were not received until October 1979. Scheduled testing was initiated in December 1979 at Yuma Proving Ground. DT/OT II tests on the XM795 High Explosive (HE) projectile were delayed as a result of minor technical problems. DT/OT II testing for the XM825 WP Smoke projectile was delayed as a result of technical problems which have subsequently been resolved.

- 2. (U) PY 1981 Program: DT/OT II testing for the XM795 will be conducted, and a technical data package (TDP) suitable for production will be completed. At present there is no planned procurement for the XM795 since the Aray's 155mm High Explosive projectile requirements are met with current assets. The XM795 will be the preferred 155mm HE projectile to meet future Army requirements. DT/OT II testing will be the initiated for the XM825 MP Smoke Projectile. NATO interoperabilities testing will continue.
- 3. (U) FY 1982 Planned Program: Rationalization, Standardization, and Interoperability (RSI) testing will be enformed using trilateral nations' propelling charges and US smoke projectiles in M198 and M109Al Howitzers to confirm interoperability. DT/OT II testing for the XMR25 smoke round will be completed, and a DEVA-IPR for type classification will be conducted.
- 4. (U) PY 1983 Planned Program: The Trilateral Smoke and Illumination Projectile will be tested for interoperability in the HID9 series and H198 Howitzers. Engineering Development of the Sense and Destroy Armor (SADARM) projectile will be initiated in project D369.
 - 5. (U) Program to Completion: This is a continuing program.

UNCLASSIFIED

11-485

At lack Latte Land Control

UNCLASSIFIED
FY 1982 RDTE CONGRESSIONAL DESCRIPTIVE SUMMARY

Program Element: #6.46.32.A

DOD Mission Area: #211 - Close Combat

Title: 105mm Tank Ammunition
Budget Activity: 14 - Tactical Support

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

Project Number	Title TOTAL FOR PROGRAM ELEMENT	FY 1980 Actual 1844	FY 1981 Estimate 3717	FY 1982 Estimate 5297	FY 1983 Estimate 4576	Additional to Completion 25128	Total Betimated Gost 40562
D173	QUANTITIES Tank Target Practice	0	431	0	0	0	2725 431
DG21	Service Amounition	1844	3286	5297	4576	25128	40131

- B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The purpose of this program is to develop 105mm tank ammunition to meet near-term and future enemy threats through the improvement of terminal effectiveness, accuracy, range, and reliability; and companion training ammunition. The program element consists of two projects. Project DI73 supports development of cartridge 175mm, Target Practice, Fin-Stabilized, Discarding Sabot Tracer (TPFSDS-T) XM797. This cartridge is a ballistically similar training companion to the M735 and M774 Armor-Piercing, Fin-Stabilized, Discarding Sabot Tracer (APFSDS-T) cartridge. A reduced range permits tank crew training on ranges throughout the world which are too small to accommodate firings of service ammunition for training. Project DG21 provides for the Engineering Development of Cartridge, Armor-Piercing, Fin-Stabilized, Discarding Sabot-Tracer (APFSDS-T) XM833, and Cartridge, High-Explosive Antitank Multipurpose Tracer (HEAT-MP-T) XM815. The XM833 employs modern technology to combat threats projected beyond the mid-1980's. The round is required to insure that the fleet of 105mm Gun Tanks will be capable of defeating the newest armors now appearing on threat tanks. The XM815 is a companion to the APFSDS-T cartridge and provides a significantly improved capability against light armored vehicles, fort'fications, and personnel.
- C. (U) BASIS F: FY: 982 RDTE REQUEST: The FY 1982 program completes Engineering Development (ED) of the APFSDS-T cartridge XM813 and type lassifies the round. Engineering Development of the HEAT-MP-T Cartridge XM815 will be initiated with the fabrication of cirridges for development testing; conduct of tests to verify strength of design, penetration, accuracy, fuze functioning, and subsequent refinement of design.

UNCLASSIFIED

Program Element: #6.46.32.A

DOD Mission Area: #211 - Close Combat

UNCLASSIFIED Title: 105mm Tank Ammunition
Budget Activity: 14 - Tactical Support

Milestone Dates Shown in FY 1981 Submission Current Major Milestones Milestone Dates Cartridge, 105mm, XHSL5 Validation Inprocess Review 4QFY81 Not Shown 4QFY84 Type Classification Not Shown Cartridge, 105mm XM833 Validation In-process Review 1QFY81 4QFY80 Type Classification 4QFY82 4QFY82

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

	PY 1980	PY 1981	FY 1982	Additional To Completion	Total Estimated Cost
RDTE Funds (current requirements) Funds (as shown in FY 1981	1844	3717	5297	25128	40562
ampugaatou)	1400	4231	1959	8136	17689

The increase in FY 1982 is to provide for Engineering Development of the XM815 HEAT-MP-T cartridge. Engineering Development had been postponed pending redefinition of requirements as was reflected in the FY81 submission and was further reduced by the application of general Congressional reductions. Additional to complete and total estimated cost (increases reflect completion of the XX815 Engineering Development and initiation of Engineering Development for the Rocket-Assisted Kinetic Energy projectile in the outyears. This is a continuing program and total estimated cost represents anticipated requirements through FY 1986 only.

UNCLASSIFIED

11-487

Alleman all the same of the

Program Element: 16.46.32.A

DOD Mission Area: 1211 - Close Combat

UNCLASSIFIED

Title: 105mm Tank Ammunition
Budget Activity: 14 - Tactical Support

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

	PY 1980 Actual	FY 1981 Estimate	FY 1982 Estimate	PY 1983 Estimate	Additional To Completion	Total Estimated Cost
Procurement of Ammunition, Army						
XM833 Cartridge						
Funds (current requirements)	0	0	0	88300	297300	Continuing
Funds (as shown in FY 1981 submission)		Not	Shown			
Quantities (current requirements) Quantities (as shown in FY 1981	Q	0	0	114000	347000	Continuing
submission)		NOC	Shown			
XM197 Cartridge Funds (current requirements)	0	0	0	101200	539100	Continuing
Funds (as shown in FY 1981 submission)	0	0	0	0	336200	Continuing
Quantitles (current requirements)			0	178000	995000	Continuing
Quantities (as shown in FY 1981 submission)	9	0 .	0	0	799000	Continuing

UNCLASSIFIED

IJ-488

Program Element: #5.46.32.A

DOD Mission Area: #211 - Close Combat

UNCLASSIFIED

Title: 105mm Tank Amounttion
Budget Activity: 14 - Tactical Support

F. (U) DETAILED BACKGROUND AND DESCRIPTION: Project DG21, Tank Service Ammunition, supports fielding of the new kinetic energy cartridge XM833. This projectile employs a long-rod staballoy penetrator, lightweight sabot, and high-force propellant to obtain maximum penetration against the newest armors. The project also supports development of the modern-technology high-explosive antitank cartridge XM815 which will provide increased armor penetration and multipurpose capabilities through the use of advanced shaped charge liners and the latest fuzing techniques.

G. (U) RELATED ACTIVITIES: The activities of this Program Blement are a continuation of Advanced Development conducted in PE 6.36.33.A, Tank Ammunition Development.

(U) WORK PERFORMED BY: In-house agencies include US Army Armament Research and Development Communit (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; National Lead of Obio, Fernald, OH; and Nuclear Metals, Inc., Concord, MA. The project is managed by Project Manager, Tank Main Armament Systems, Dover, NJ, to insure no duplication of efforts

I. (U) PROGRAM ACCOMPLISMENTS AND FUTURE PROGRAMS:

- 1. (U) FY 1980 and Prior Accomplishments: Development was completed for cartridge 105mm, Armor Piercing, Fin-Stabilized Discarding Sabot-Tracer, M735. This development was completed for cartridge 100mm, Armor-Pictoting, Fin-Stabilized Discarding Sabot-Tracer, M735. This development was completed and the round type classified standard in FY 1977. It is now in production. Full-scale Englineering Development of the more advanced XM774 kinetic energy cartridge was completed and the round type classified in September 1980. The Target Practice Fin-Stabilized, Discarding Sabot-Tracer XM797 cartridge transitioned to Engineering Development in 1980 and will be type classified in FY82.
- 2. (U) FY 1981 Program: Engineering Development efforts including fabrication of Development Test II (DT II) hardware and Development Test II of the TPPSDS-T XM797 cartridge will be continued in FY81. This round is plauned for type classification in FY82. Full-scale Engineering Development of the APPSDS-T XM833 cartridge was initiated with successful completion of Development Test 1. Prototypes will be fabricated and tested to finalize projectile design.
- 3. (U) FY 1982 Plannel Program: Full-scale Engineering Development of the APFSDS-T XM833 carroidge will continue. Manufacture of DT II projectiles will commence and testing will be conducted leading to type classifi ation of the round in 40 FY82. Engineering Development of the HEAT-MP-T XMS15 will be initiated. Prototypes will be fabrilated and tested to evaluate design. Subsequent design changes will be integrated and evaluations made of penetration, a curacy, and fuzing.
- 4. (U) FY 1993 Planned Program: SD of the XM815 will continue with design validation testing and initiation of magnifacture of DT II hardware.

UNCLASSIFIED

11-489

Mr. Balaite and the land of the con-

Program Element: 16.46.32.A

DOD Mission Area: 1211 - Close Combat

UNCLASSIFIED

Title: 105mm Tank Ammunition
Budget Activity: 14 - Tactical Support

5. (U) Program to Completion: The HEAT-MP-T XM815 cartridge will complete Full-Scale Engineering Development and be type classified in FY 1984. The Rocket-Assisted Kinetic Energy projectile will begin Engineering Development during this period.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Date Entered)

REPORT DOCUMENTATION PAGE	BEFORE COMPLETING FORM
1. 10	3. RECIPIENT'S CATALOG NUMBER
N/A A10130	6
4. TITLE (and Subritte) Volume II - Descriptive Summaries	S. TYPE OF REPORT & PERIOD COVERED
of the Research, Development, Test and Evaluation,	RDTE Descriptive Summaries
Army Appropriation FY 1982, Supporting Data FY	FY 1982
1982 Budget Estimate Submitted to Congress	6. PERFORMING ORG. REPORT NUMBER
January 1981 (Amended 30 Mar 81)	S. CONTRACT OR GRANT NUMBER(s)
All Honday	
Department of the Army	
3. PERFORMING ORGANIZATION NAME AND ADDRESS	10. PROGRAM ELE- "H", PROJECT, TASK AREA & WORK UNIT NUMBERS
HQDA, Office of the Deputy Chief of Staff for	
Research, Development, and Acquisition (DAMA-PPR-B)	
Washington, DC 20310	
11. CONTROLLING OFFICE NAME AND ADDRESS	12. REPORT DATE
HQDA, Office of the Deputy Chief of Staff for Research, Development, and Acquisition (DAMA-AOA-S)	January 1981
Washington, DC 20310	490
14. MONITORING AGENCY NAME & ADDRESS(If different from Convolling Office)	IS. SECURITY CLASS. (of this report)
	UNCLASSIFIED
	184. DECLASSIFICATION/DOWNGRADING
16. DISTRIBUTION STATEMENT (of this Report)	,
	` ·
Approved for public release; distribution unlimited	•
•	
17. DISTRIBUTION STATEMENT (of the obstroct entered in Block 20, if different fre	m Report)
	·
18. SUPPLEMENTARY NOTES	
19. KEY WORDS (Centinue on reverse side if necessary and identify by block number,	
Army Research, Development, Test and Evaluation Bud	get backup for estimates
submitted to Congress in January 1981 for FY 1982.	
20. ABSTRACT (Continue on reverse side If necessary and identify by block number)	
	i
	i

Andrew Control of the Control of the

DD 1 JAN 79 1473 EDITION OF 1 NOV 65 IS OSSOLETE

UNCLASSIFIED II-491
SECURITY CLASSIFICATION OF THIS PAGE (Rues Date Entered)

DATE FILMED 8-8

DTIC