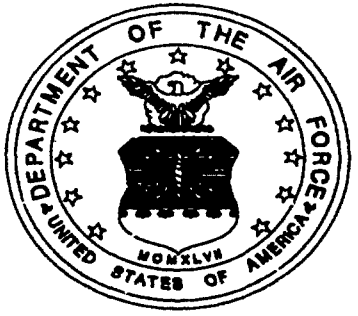
DEPARTMENT OF THE AIR FORCE

SUPPORTING DATA FOR FISCAL YEAR 1995

RESEARCH, DEVELOPMENT, TEST AND EVALUATION

DESCRIPTIVE SUMMARIES



FEBRUARY 1994

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DESCRIPTIVE SUMMARIES FOR PROGRAM ELEMENTS OF
THE DEPARTMENT OF THE AIR FORCE RESEARCH AND DEVELOPMENT PROGRAM
FY 1995 BUDGET ESTIMATES
FEBRUARY 1994

INTRODUCTION AND EXPLANATION OF CONTENTS

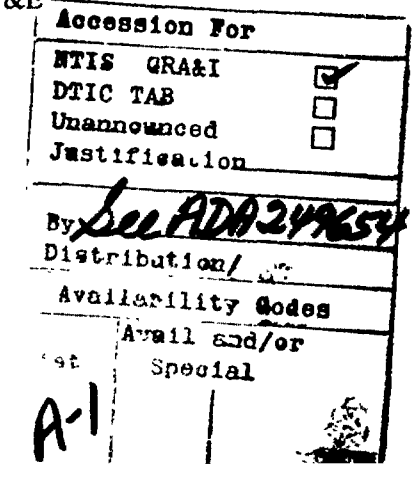
1. (U) GENERAL. This document has been prepared to provide information on the United States Air Force (USAF) Research, Development, Test and Evaluation (RDT&E) program to Congressional committees during the Fiscal Year 1995 hearings. This information is in addition to the testimony given by DOD witnesses.

a. (U) The Descriptive Summaries provide narrative information to all RDT&E program elements and projects, except those listed in paragraph 4b, within the USAF FY 1995 RDT&E program. The formats and contents of this document are in accordance with the guidelines and requirements of the Congressional committees insofar as possible.

b. (U) The "RESOURCES" portion of the Descriptive Summaries includes, in addition to RDT&E funds, Procurement funds and quantities, Military Construction appropriation funds on specific development programs, Operations and Maintenance appropriation funds where they are essential to the development effort described, and, where appropriate, Department of Energy (DOE) costs.

c. (U) The section of the Fiscal Year 1995 Descriptive Summaries entitled "Facilities Exhibits" located in the back of the book contains information on major improvement to and construction of government owned facilities funded by RDT&E.

d. (U) In order to better identify the types of efforts being performed in a particular program, the previous budget activities (i.e., Technology Base, Advanced Technology Development, Strategic Programs, Tactical Programs, Intelligence Programs, Defensewide Management & Support) have been replaced with research categories (6.1 Basic Research; 6.2 Exploratory Development; 6.3a, Advanced Development; 6.4 Demonstration and Validation; 6.5 Engineering and Manufacturing Development; 6.6 RDT&E Management Support; 6.7 Operational Systems Development.



2. (U) COMPARISON OF FISCAL YEARS 1994 AND 1995 DATA. A direct comparison of Fiscal Years 1994 and 1995 data shown in this document with corresponding data in the Descriptive Summaries dated April 1993 will reveal differences. Many of the differences are attributable to the following:

a. (U) Fiscal Year 1994 funding changes as a result of Congressional action on the appropriation and/or proposed RDT&E reprogramming actions.

b. (U) Fiscal Year 1993 funding changes between October 1, 1992 and September 30, 1993 due to RDT&E reprogramming actions, Supplemental Appropriations, and rescissions.

c. (U) Reclassification of FY 1993 and FY 1994 data to achieve comparability with the program structure for Fiscal Year 1995.

3. (U) Relationship of Fiscal Year 1995 budget structure to the Fiscal Year 1994 Budget approved by the Congress:

PROGRAM ELEMENT (PE)		REMARKS
0603269F	National Aerospace Plane (NASP)	PE deleted in FY 95;efforts transferred to new PE 0602269F, Hypersonic Flight Technology.
0601101F	In-House Laboratory Indep Res	PE deleted in FY 95.
0602101F	Geophysics	PE deleted in FY 95.
0602302F	Rocket Prop & Astronautics	PE deleted in FY 95.
0603308F	Strategic Missile Modernization	New PE proposed for FY 95.
0603430F	Advanced MILSATCOM	New PE proposed for FY 95. Previously in PE 0303601F.
0603434F	DMSP, Block 6	PE restructure. FY 94 & prior in PE 0305160F.
0603441F	Adv Sp Based TW/AA (Dem Val)	PE restructure. FY 94 & prior in PE
0603800F	Joint Strike Adv Tech Program	New PE proposed for FY 95; Air Force/Navy program
0604479F	MILSTAR LDR/MDR Sat Comm	PE restructure; Previously in PE 0303601F
0305111F	Weather Service	PE restructure; Previously in PE 0604707F.
0303606F	UHF Satellite Communicaticns	New PE proposed for FY 95.
0207422F	Deployable C3 Systems	New PE proposed for FY 95.
0208060F	Theater Missile Defense	New PE proposed for FY 95.

4. CLASSIFICATION.

a. (U) Classified pages bear the appropriate security classification. Classified data is identified by use of brackets { }.

b. Due to the level of security classification and the necessity of special security clearances, descriptive summaries have not been included for a number of programs. These programs are:

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128	0101213F	Minuteman Squadrons	4
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133	0102411F	Surveillance Radar Stations/Sites(SRS)	29
134	0102412F	DEW Radar Stations	32
135	0207129F	F-111 Squadrons	35
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FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0101120F
Date: February 1994
PE Title: Advanced Cruise Missile (ACM)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
673844, Advanced Cruise Missile (ACM)								
19,219	25,251	0	0	0	0	0	0	44,470

B. (U) BRIEF DESCRIPTION OF ELEMENT: The ACM is a low-observable, air-launched, strategic cruise missile with significant improvements in range, accuracy, and survivability over the ALCM-B. Armed with a W80 warhead, it is designed to evade air and ground-based defenses in order to strike heavily defended, hardened targets at any location within the territory of any potential enemy. The ACM is designed for external carriage on the B-52H. Because the majority of program effort involves organic depot development, all work is budgeted in research category 6.7, Operational Systems Development.

(U) TECHNICAL PERFORMANCE PARAMETERS:

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0101120F
PE Title: Advanced Cruise Missile (ACM)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) 673844, Advanced Cruise Missile (ACM): The majority of the remaining development effort on ACM is to complete organic depots. This activity has already had substantial investment and the depot capabilities are being activated incrementally as equipment, software and training becomes available. The remaining depot development activities include the guidance shop repairable units (SRUs), sensor SRUs, and software maintenance capability for the operational flight software.

(U) FY 1993 Accomplishments.

- (U) Continued depot development ($10,900)
- (U) Developed test set for Test Payload Kits ($3,100)
- (U) Mission support/other ($5,219)

(U) FY 1994 Plans:

- (U) Complete Test Set Payload Kits ($1,500)
- (U) Continue depot development ($18,251)
- (U) Mission support/other ($5,500)

(U) FY 1995 Plans: Not Applicable. Decision pending completion of organic depots or initiation of contractor logistics support.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0101120F
PE Title: Advanced Cruise Missile (ACM)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

(U) Work Performed By: General Dynamics Corporation/Convair Division (GD/C), San Diego, CA, was selected as the prime contractor in mid-April 1983. GD/C was sold to Hughes Aircraft Company in August 1992. Contracts for the engine (Williams International, Walled Lake, MI) and aircraft integration (B-52 and the Common Strategic Rotary Launcher [CSRL]: Boeing-Wichita) were subsequently awarded. Congress directed development of a second source (McDonnell Douglas Missile Systems Company, Titusville, FL). The ACM completed a combined developmental and operational test and evaluation program in July 1990. The 31st Test and Evaluation Squadron (SAC), in conjunction with the 6510th Test Wing (AFFTC), was the responsible test agency. The Systems Program Office (ASC/VC) will provide management and supply support until July 94 when Oklahoma City Air Logistics Center (OC-ALC) will accept primary management responsibility. ASC/VC will continue to support the program through 1996.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: #14 (Weapons Procurement), Budget Activity #7(Missile procurement and modifications), ACM								
98,581	5,337	0	1,885	1,900	1,905	2,104	0	111,712

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0101213F
PE Title: Minuteman Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
133B Rapid Execution and Combat Targeting								
15,666	26,001	21,792	4,092	0	0	0	0	293,097
3085 Guidance Replacement Program								
*0	86,939	100,383	102,016	52,621	0	0	60,878	*452,200
4208 Reentry System Launch Program								
8,520	***0	**0	**0	**0	**0	**0	**0	**0
4209 Long Range Planning								
2,518	2,504	3,627	4,521	4,545	4,747	4,882	Cont	TBD
4210 Propulsion Replacement Program								
0	14,916	25,873	62,780	50,511	0	0	192,020	346,100
26,704	130,360	151,675	173,409	107,677	4,747	4,882	252,898	1,091,397

* 49,363 funded from PE 0604312F, ICBM Modernization.
** FY95-FY99 funds transferred to PE 0603308F, Strategic Missile Modernization.
*** FY94 funds transferred to PE 0305119F, Medium Launch Vehicles.

Program Element: 0101213F **Date:** February 1994
PE Title: Minuteman Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

B. (U) BRIEF DESCRIPTION OF ELEMENT: Ongoing efforts emphasize extending the operational life of the Minuteman III ICBM weapon system beyond 2020. DoD directed the Air Force to expand its effort to extend the life of the Minuteman III. The Rapid Execution and Combat Targeting Program replaces unsupportable (1960's) Minuteman launch control center (LCC) equipment and provides state of the art command, control, and communication systems. The Guidance Replacement Program will replace the Minuteman III (NS-20) guidance set electronics. Long Range Planning examines Minuteman subsystem modification options required to meet user objectives. The Minuteman III Propulsion Replacement Program will refurbish all three solid fuel stages to correct identified age-related degradations and maintain existing weapon system reliability. These efforts were defined and validated in DoD's Minuteman III Life Extension Report to Congress, dated 29 Jul 92. These projects are assigned research category 6.7, operational systems development, because they will extend the life of the operational Minuteman Weapon System.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) 4209 Long Range Planning: The Long Range Planning (LRP) task examine Minuteman subsystem modification options required to meet user objectives for system life extension. LRP plans, studies and projects focus on operability, supportability and maintainability considerations. Options are evaluated for implementation, schedule, and cost issues.

(U) FY 1993 Accomplishments:
- (U) - Continued Computer Aided Flaw Detection and Evaluation (CAFDE) Phase I development to provide capability to automatically evaluate Computed Tomography (CT) images of Minuteman II Stage III and identify defects through an interface with the existing 9 million electron volts (MeV) CT machine. ($424)
- (U) - Supported Long Range Planning tasks. Produced Annual Weapon System Master Plan, a summary of all efforts required to maintain ICBM weapon systems for the next 20 years. ($542)
- (U) - Supported the joint DoD/DOE phase II DOE warhead options study as directed by the SECAF in response to the Drell Committee report. ($169)
- (U) - Continued technology insertion studies. Updated the Systems Options Report. This report evaluates other DoD, service, and industry technical efforts and reports to determine applicability to ICBM requirements. ($1,283)
- (U) - Evaluated the feasibility of deploying the Mk 21 warhead on the Minuteman III. ($100)

Program Element: 0101213F
PE Title: Minuteman Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

Date: February 1994

(U) FY 1994 Plans:
- (U) - Complete Computer Aided Flaw Detection and Evaluation (CAFDE) Phase I development, installation, and checkout. ($130)
- (U) - Support Long Range Planning tasks and produce Annual Weapon System Master Plan. ($398)
- (U) - Continue warhead studies on Mk 12, Mk 12A and Mk 21 options and safety improvements. ($925)
- (U) - Continue technology insertion studies and update the Systems Options Report. ($560)
- (U) - Conduct individual program efforts in direct support of Minuteman III life extension. This includes studying command and control, future operational concepts, analyzing aerospace vehicle equipment systems, and evaluating critical 1960's era electronic equipment in silos. ($491)

(U) FY 1995 Plans:
- (U) - Initiate Phase II development to provide the capability to automatically evaluate Computed Tomography (CT) images of Minuteman II Stages I and II, identify defects, store data in historical files, and compare images through an interface with the 15 million electron volt machine to be on-line by FY95. ($1,424)
- (U) - Support Long Range Planning tasks and produce Annual Weapon System Master Plan. ($775)
- (U) - Continue technology insertion studies and conduct program efforts in direct support of Minuteman III life extension. ($1,428)

(U) Work Performed By: The Silo-Based ICBM System Program Office, Hill AFB, UT, is the responsible agency for this program.

(U) Related Activities:
- (U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0101213F
PE Title: Minuteman Squadrons

Project: 133B **Date:** February 1994
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

A. (U) RESOURCES ($ in Thousands)

FY 1993 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Rapid Execution and Combat Targeting (REACT)								
15,666	26,001	21,792	4,092	0	0	0	0	293,097

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Minuteman launch control centers (LCCs) have been deployed since the early 1960's. Since the original deployment, numerous communications and weapon system modifications have been installed on a stand-alone basis without consideration for human engineering interfaces and space limitations of the Minuteman LCC. Additional communications requirements and changes in crew procedures have, over time, resulted in task saturation of the crew members. Air Force Materiel Command (AFMC) studies show that the Weapon System Control Element (WSCE) is reaching the end of its useful life. Manufacturers no longer produce many of the replacement parts and computer memory capacity has reached its limits. The Rapid Execution and Combat Targeting (REACT) program was initiated in 1988 to address these concerns. The program combines five related efforts into one to improve maintainability, supportability, responsiveness and operability of the weapon system: Weapon System Controller (WSC) hardware replacement, Rapid Message Processing (RMP), rapid retargeting software, launch control center console integration, and Missile Procedures Trainer (MPT) computer replacement. The program will modify Minuteman LCCs and associated trainers. The new WSCE provides significantly increased system capacity and eliminates supportability difficulties of the current WSC. REACT will be integrated into the AM and B weapon systems. The RMP element and rapid retargeting will streamline current procedures and provide greater flexibility for crew members responding to critical National Command Authority directives. The MPT modification will reflect current operational configurations and ensure crew members receive maximum benefit from training time. The REACT program is funded as research category 6.7, Operational Systems Development. This project is designed to sustain a fielded operational weapon system.

Program Element: #0101213F
PE Title: Minuteman Squadrons

Project: 133B **Date:** February 1994
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   (U) - Continued Weapon System Control Element (WSCE) hardware and software development. ($5,560)
   (U) - Continued Rapid Execution and Combat Targeting (REACT) communications element development. ($4,359)
   (U) - Continued Nuclear Surety Cross Check Analysis (NSCCA) of operational software. ($751)
   (U) - Supported Software Testing. ($1,018)
   (U) - Continued supporting engineering and management. ($3,978)

2. (U) FY 1994 Planned Program:
   (U) - Continue WSCE hardware and software development. ($16,504)
   (U) - Continue REACT Communications Element development. ($5,435)
   (U) - Continue NSCCA of operational software. ($3,025)
   (U) - Conduct WSCE software functional configuration audit (FCA)/physical configuration audit (PCA) (AM), complete formal AM weapon system testing. ($1,037)

3. (U) FY 1995 Planned Program:
   (U) - Continue WSCE hardware and software development. ($12,000)
   (U) - Continue REACT communications element development. ($3,455)
   (U) - Continue NSCCA of operational software. ($2,266)
   (U) - Complete depot activation, obtain First Asset Delivery (FAD) (AM), complete AM weapon system deployment, conduct B system software FCA/PCA, begin B weapon system Initial Operational Test and Evaluation (IOT&E), complete formal B weapon system test, obtain nuclear certification of B weapon system software. ($4,071)

4. (U) Program to Completion:
   (U) - Achieve Last Asset Delivery (LAD).

Program Element: #0101213F
PE Title: Minuteman Squadrons

Project: 133B **Date:** February 1994
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

D. (U) WORK PERFORMED BY: Loral Command and Control Systems, Colorado Springs, CO, was awarded the Weapon System Control Element (WSCE) portion of the Rapid Execution and Combat Targeting (REACT) contract, overseen by Silo Based ICBM SPO. GTE, Needham, MA, was awarded the REACT Communications Element contract, overseen by Electronic Systems Division (ESD). The responsible Air Force agency for the overall project is AFPEO/ST.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: A revised program baseline was approved in October 1993. The original REACT program First Asset Delivery (FAD) will slip from September 1993 to October 1994 with Last Asset Delivery (LAD) slip from October 1995 to February 1996.

3. (U) COST CHANGES: Requested funding increase:

	FY95	FY96	TOTAL	
3600	21,792	4,092	25,884	Based on revised baseline.

F. (U) PROGRAM DOCUMENTATION:
(U) - SAC SON 6-85, ICBM Rapid Message Processing and Retargeting, 22 August 86.
(U) - SAC SON 14-86, ICBM Launch Control Center Integration, 8 November 87.
(U) - SAC ROC 2-75, Ground Wave Emergency Network.
(U) - SAC ROC 6-70, Milstar.
(U) - SAC SORD 14-86-I/II (Revised), Rapid Execution and Combat Targeting, 15 April 91.

G. (U) RELATED ACTIVITIES:
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0101213F
PE Title: Minuteman Squadrons

Project: 133B **Date:** February 1994
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY 1993 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3020, Budget Activity 03, Program Title Minuteman II/III Modifications (REACT)								
107,800	7,400	0	16,900	0	0	0	0	324,250

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

1.	(U) Full Scale Development (FSD) contract award	Apr 1989
2.	(U) System Design Review (SDR)	Jul 1989
3.	(U) Preliminary Design Review (PDR)	Mar 1990
4.	(U) Critical Design Review (CDR)	Mar 1991
5.	(U) Production Contract Award	Jul 1991
6.	(U) First Asset Delivery (FAD)	Oct 1994
7.	(U) Last Asset Delivery (LAD)	Feb 1996

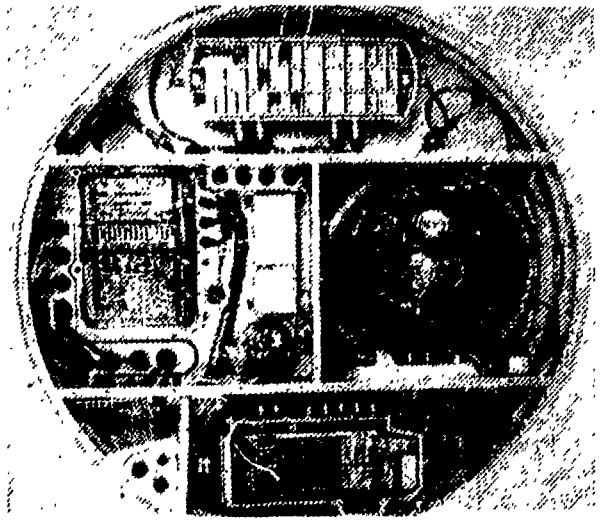
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0101213F
PE Title: Minuteman Squadrons

Project Number: 3085
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

Date: February 1994

Project Title: Minuteman III Guidance Replacement Program



Program Element: #0101213F
PE Title: Minuteman Squadrons
Project Number: 3085
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs
Date: February 1994

POPULAR NAME: Guidance Replacement Program (GRP) Phase 1

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	Milestone II AFSARC Aug 93				Milestone III AFSARC 4QFY97			
Engineering Milestones		SDR 2QFY94	PDR 4QFY95	CDR 3QFY96	FCA 3QFY97 PCA 4QFY97			
T&E Milestones				Combined DT&E/IOT&E Start 1QFY96	First Flight Test 2QFY97			
Contract Milestones	EMD Contract Award Aug 93	NSCCA/IV&V Contract Award 3QFY94		Low Rate Intl Prod Contract Award 4QFY96		First Asset Delivered 1QFY98		

BUDGET ($000)	FY 1993	FY 1994	FY 1995	FY 1996	F 1997	FY 1998	FY 1999	Budget Total (To Complete)
Major Contract	31,723	54,315	74,932	67,190	34,861			296,200 (33,179)
Support Contract	3,770	7,150	2,900	8,710	3,770			32,108 (5,808)
In-House Contract	8,290	9,500	8,270	9,680	4,510			45,509 (5,259)
GFE/Other	5,580	15,974	14,281	16,436	9,480			78,383 (16,632)
Total	49,363	86,939	100,383	102,016	52,621	0	0	452,200 (60,878)

Program Element: #0101213F **Project Number: 3085** **Date: February 1994**
PE Title: Minuteman Squadrons **Budget Activity : #7 Operational Systems Development**
Old Budget Activity: #3 Strategic Programs

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: As a result of various arms control initiatives, the Minuteman III is projected to become the only land-based ICBM in the TRIAD when Minuteman II and Peacekeeper are retired. Ongoing Minuteman life extension efforts are required to extend the life of the Minuteman III through 2020. These efforts were defined in OSD's Minuteman III Life Extension Report to Congress, which was submitted on July 29, 1992. The Joint Requirements Oversight Council validated the Mission Need Statement for a Future Guidance System for Intercontinental Ballistic Missiles on November 5, 1992. The Guidance Replacement Program (GRP) replaces/upgrades the Minuteman III (NS-20) guidance set using a two-phased approach. GRP Phase 1 replaces 1960's guidance system electronics and protects the capability to configure the missile with the Peacekeeper Mark 21 reentry vehicle and an advanced Inertial Measurement Unit, if required. The guidance electronics components must be replaced since current electronics components continue to degrade and are projected to become unreliable as early as 1997 and unsupportable as early as 1998. The Engineering and Manufacturing Development (EMD) contract was awarded to Rockwell International in August 1993. GRP Phase 2 develops capabilities for Minuteman III dormant alert operations and increased reliability, maintainability and nuclear safety leading to reduced life cycle costs. This descriptive summary only addresses GRP Phase 1. GRP is in research category 6.7, Operational Systems Development. GRP includes the engineering and manufacturing development (EMD), production, and installation of replacement guidance components to extend the life of the operational Minuteman III Intercontinental Ballistic Missile.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Awarded Phase 1 Engineering and Manufacturing Development (EMD) contract. ($31,723)
   - (U) - Supported source selection and Air Force Systems Acquisition Review Council (AFSARC) process. ($8,290)
   - (U) - Other engineering and support costs. ($5,580)
   - (U) - Began gyro stabilized platform (GSP)/electronics interface characterization. ($3,770)
   - (U) - Milestones: source selection and Milestone II AFSARC.

Program Element: #0101213F
PE Title: Minuteman Squadrons
Project Number: 3085
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs
Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) - Continue Phase 1 hardware and software development. ($54,315)
   - (U) - Award Nuclear Surety Cross Check Analysis/Independent Validation and Verification (NSCCA/IV&V) contract. ($3,250)
   - (U) - Complete Gyro Stability Platform (GSP)/electronics interface characterization; begin error model & budget. ($2,690)
   - (U) - Conduct Nuclear Hardening and Survivability (NH&S) electronics testing. ($1,430)
   - (U) - Award ICBM Codes development contract. ($1,210)
   - (U) - System engineering and technical support. ($9,500)
   - (U) - Other engineering and support costs. ($14,544)
   - (U) - Milestones: System Requirements Review (SRR), System Design Review (SDR).

3. (U) FY 1995 Planned Program:
   - (U) - Continue Phase 1 hardware and software development. ($74,932)
   - (U) - Continue NSCCA/IV&V of operational software. ($2,563)
   - (U) - Continue ICBM Codes development. ($2,020)
   - (U) - System engineering and technical support. ($8,270)
   - (U) - Other engineering and support costs. ($12,598)
   - (U) - Milestones: Preliminary Design Review (PDR).

4. (U) Program to Completion:
   - (U) - Perform combined Development Test and Evaluation/Initial Operational Test and Evaluation (DT&E/IOT&E) testing
   - (U) - Award Low Rate Initial Production (LRIP) contract
   - (U) - Milestones: Critical Design Review (CDR).
   - (U) - Perform first flight test.
   - (U) - Functional and Physical Configuration Audits, First Asset Delivered (FAD).

Program Element: #0101213F
PE Title: Minuteman Squadrons
Project Number: 3085
Date: February 1994
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

D. (U) WORK PERFORMED BY: The program is managed by the Silo-Based ICBM System Program Office at Hill Air Force Base, UT. The primary Engineering and Manufacturing Development (EMD) contractors for the Guidance Replacement Program (GRP) include Rockwell International, Anaheim, CA and Honeywell Incorporated, Clearwater, FL. Other supporting contractors are TRW, San Bernardino, CA, and Charles Stark Draper Laboratory (CSDL), Cambridge, MA. Facilities at Hill AFB, UT, Sandia Labs, NM, and Kirtland AFB, NM will be used for integration and nuclear hardness testing. Other contracts will be awarded.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: Various intermediate milestones have changed based on the negotiated schedule with the Guidance Replacement Program (GRP) Phase 1 EMD contractor in Aug 93. First Asset Delivered (FAD) also slipped one quarter due to the protested award of the Engineering and Manufacturing Development (EMD) contract and almost two months stop work order.

3. (U) COST CHANGES: The FY94 Descriptive Summary contained the best estimate to complete the Guidance Replacement Program. The Aug 93 Milestone II Air Force Systems Acquisition Review Council (AFSARC) approved the Service Cost Position (SCP) for GRP Phase 1.

	FY95	FY96	FY97	TO COMPLETE
3600 ($M)	100.4	102.0	52.6	59.8

Program Element: #0101213F
PE Title: Minuteman Squadrons
Project Number: 3085
Date: February 1994
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

F. PROGRAM DOCUMENTATION:

(U) - AFLC SON 001-90, Improved Reliability/Maintainability Advanced Guidance System for ICBMs, 15 Apr 91.
(U) - CAF MNS 356-92, Future Guidance System for Intercontinental Ballistic Missiles, 20 Oct 92.
(U) - CAF 356-92-I-A, Operational Requirements Document (ORD) for Minuteman III Guidance Replacement, 25 Mar 95.
(U) - AFSPACECOM 356-92-I-A, Cost and Operational Effectiveness Analysis (COEA) for Minuteman III Guidance Replacement, 31 Aug 93.
(U) - Integrated Program Summary (IPS) for Minuteman III Guidance Replacement Program, 23 Aug 93.
(U) - Minuteman III Guidance Replacement Program Test and Evaluation Master Plan (TEMP), 24 Aug 93.
(U) - Minuteman III Guidance Replacement Program Phase 1 Acquisition Program Baseline (APB), 30 Aug 93.

G. RELATED ACTIVITIES:

(U) - An inertial measurement unit (IMU) is being developed in the Advanced Inertial Measurement System (AIMS) Advanced Technology Transition Demonstration (ATTD) program (PE 63311F). The AIMS is a promising candidate for GRP Phase 2.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3020, Budget Activity 03, Program Title Guidance Replacement Program								
0	0	0	116,000	296,000	290,200	236,400	245,400	1,184,000

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

Program Element: #0101213F
PE Title: Minuteman Squadrons

Project Number: 3085
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

Date: February 1994

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Not Applicable		

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
First Engineering Model (EM)	Feb 95	
Weapon System Testing Start (EM)	Aug 95	
Software Qual Test Start	Feb 96	
Weapon System Testing with Operational Model (OM)	May 96	
AFOTEC Operational Assessment	May 96	
Pathfinder/Mod-7 Integration	May 96	
Integration Demonstration Flt 1	Nov 96	
Integration Demonstration Flt 2	Apr 97	
AFOTEC Final Report	May 97	

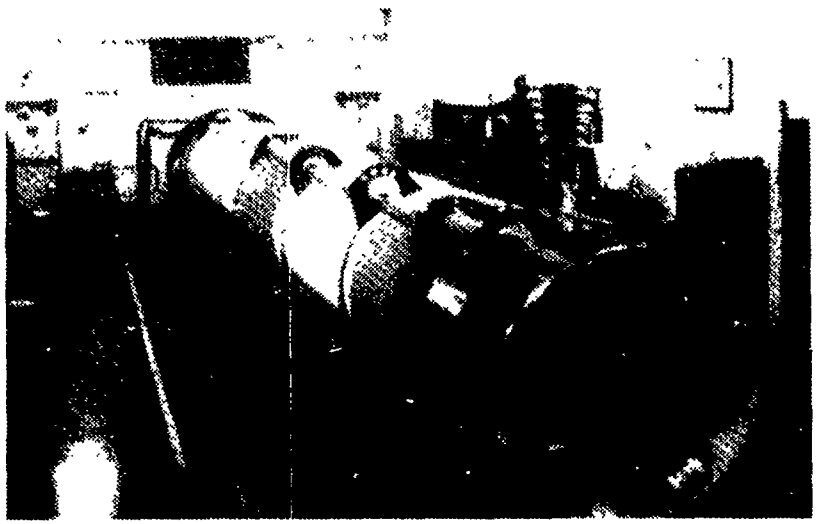
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0101213F
PE Title: Minuteman Squadrons

Project Number: 4210
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

Project Title: Minuteman III Propulsion Replacement Program



Program Element: 0101213F
PE Title: Minuteman Squadrons

Project Number: 4210
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

POPULAR NAME: Minuteman III Propulsion Replacement Program

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	Milestone O Decision 7/93	Milestone I/II Review 6/94					Milestone III Decision (TBD)	
Engineering Milestones	N/A	Replacement Studies 7/94	Design Development 1Q/FY95	Design Development 1Q/FY96	Stage PDRs 1Q/FY97	CDR 3Q/FY98		
T&E Milestones	N/A	N/A	Change Verification Test 1Q/FY95	Change Verification Test 1Q/FY96	Change Verification Test 1Q/FY97	Qualification Test 3Q/FY98	Qualification Test 1Q/FY99	Flight Test (TBD-See Schedule Chg)
Contract Milestones	RFP Release 9/93	Tech Insertion Contract Award 6/94		Software Contract Award 2Q/FY96			LRIP Contract Award (TBD-See Sch Chg)	Prod Contract Award (TBD-See Schedule Change)
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**F 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	N/A	14,881	22,496	53,344	42,919	TBD-See Cost Changes	TBD-See Cost Changes	296,799 (163,159)
Support Contract	N/A	0	3,247	6,296	5,066	TBD-See Cost Changes	TBD-See Cost Changes	33,868 (19,259)
In-House Contract	N/A	35	130	3,140	2,526	TBD-See Cost Changes	TBD-See Cost Changes	15,433 (9,602)
GFE/Other	N/A	0	0	0	0			0 (0)
Total	N/A	14,916	25,873	62,780	50,511	TBD-See Cost Changes	TBD-See Cost Changes	346,100 (192,020)

Program Element: 0101213F
PE Title: Minuteman Squadrons

Project Number: 4210 **Date:** February 1994
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

The Minuteman III Propulsion Replacement Program will remanufacture solid fuel stages to correct identified age-related degradations, maintain existing weapon system reliability. and support Minuteman III life extension. Any of the degradations (propellant cracking, case corrosion, liner deterioration, inhibitor deterioration, and liner debond) can cause catastrophic motor failure and, in turn, mission failure. The program must begin in FY94 to sustain the Minuteman III weapon system, minimize cost and schedule risks, and maintain a solid rocket motor manufacturing and supply base. RDT&E efforts will identify replacement materials that are environmentally acceptable, and are currently available, reduce life cycle costs, and identify corrections to age-related degradations. This project incorporates only changes that can be demonstrated in an appropriate time frame to ensure the Minuteman III propulsion system continues to meet existing performance capabilities and remains viable and supportable until at least 2020. This project is research category 6.7, Operational System Development. The Project will enter phase 2 in FY 94 and is designed to sustain a fielded operational weapon system.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   (U) - The Minuteman III Propulsion Replacement Program is a FY94 new start.

2. (U) FY 1994 Planned Program:
   (U) - Conduct component reuse and materials replacement studies and begin stage design and development changes. ($13,000)
   (U) - Technical integration and assembly. ($1,916)

Program Element: 0101213F
PE Title: Minuteman Squadrons
Project Number: 4210
Date: February 1994
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

3. (U) FY 1995 Planned Program:
   (U) - Continue component reuse and materials replacement studies, continue stage design and development to include tooling refurbishment. ($10,919)
   (U) - Identify stage case materials substitution and fabrication case. ($10,966)
   (U) - Test Change Verification motors. ($676)
   (U) - Technical integration and assembly. ($3,312)

4. (U) Program to Completion:
   (U) - Complete component reuse and materials replacement studies and stage design and development changes. ($128,848)
   (U) - Complete fabrication. ($129,403)
   (U) - Conduct Change Verification Motor tests and qualification tests. ($7,977)
   (U) - Technical integration and assembly. ($39,083)

D. (U) WORK PERFORMED BY: Thiokol, Brigham City, UT, was the original and only manufacturer of the stage 1 motor. Aerojet, Sacramento, CA, is the current qualified manufacturer of the Stage 2 motor. United Technologies, San Jose, CA, is the current qualified manufacturer of the Stage 3 motor. Facilities at Hill AFB, UT, Sandia Labs, NM, and Kirtland AFB, NM, will be used for integration and nuclear hardness testing.

Program Element: 0101213F
PE Title: Minuteman Squadrons
Project Number: 4210
Date: February 1994
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: Program schedule has been adjusted due to reduced FY94 and 95 RDT&E funding.
3. (U) COST CHANGES:

(U)- FY 94 RDT&E funding was reduced from $49.9M to $15.0M during the Appropriations Conference. FY 95 RDT&E funding was reduced by $26.0M during the budget review process.

F. PROGRAM DOCUMENTATION:
(U)- ACC MNS CAF 318-92 (CSAF approved 17 May 93).
(U)- AFSPC ORD CAF 318 - 92 - I/II - A (In Final Coordination).

Program Element: 0101213F
PE Title: Minuteman Squadrons

Project Number: 4210
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

G. (U) RELATED ACTIVITIES:

(U)- There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3020, Budget Activity 03, Program Title Minuteman II/III Modifications (Propulsion)								
0	0	0	0	43,000	181,600	155,900	1,691,000	2,071,500

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) TEST AND EVALUATION DATA: T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Not Applicable		

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
The Test and Evaluation Master Plan (TEMP) is in coordination. Once approved, a test schedule can be provided.		

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0102325F
PE Title: Joint Surveillance System (JSS)
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #3 - Strategic Programs

Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2976 Joint Surveillance System (JSS) Connectivity								
644	636	662	662	647	670	697	Continuing	TBD
2996 FAA/Air Force Radar Replacement (FARR)								
3,711	2,453	2,108	3,919	3,753	3,816	3,893	Continuing	TBD
Total								
4,355	3,089	2,770	4,581	4,440	4,486	4,590	Continuing	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Joint Surveillance System (JSS) provides command, control and communications (C3) capability in support of NORAD's Atmospheric Tactical Warning and Attack Assessment (ATW/AA), air sovereignty, and air defense requirements. The JSS Connectivity program provides improvements to this capability by integrating new sensor data and enhancing communications capabilities via the Advanced Interface Control Unit (AICU). The FAA/Air Force Radar Replacement (FARR) program will replace 39 existing JSS radars with solid-state, three-dimensional ARSR-4 radars to improve mission performace and reduce operation and maintenance costs.

Program Element: #0102325F **Date: February 1994**
PE Title: Joint Surveillance System (JSS)
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #3 - Strategic Programs

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project Number: 2976 Project Title: Joint Surveillance System (JSS) Connectivity:
The JSS Connectivity provides improvements to ATW/AA, air sovereignty, and air defense C3 by integrating new sensor data and enhancing communications capabilities.

(U) FY 1993 Accomplishments:
- (U) Provided program office support. ($.10M)
- (U) Provided system engineering support for the AICU. ($.544M)

(U) FY 1994 Plans:
- (U) Provide program office support. ($.102M)
- (U) Provide system engineering support for Automated Air Movement Data System (AAMDS). ($.534M)

(U) FY 1995 Plans:
- (U) Provide program office support. ($.103M)
- (U) Provide system engineering support for AAMDS. ($.559M)

(U) Work Performed By: Air Force program management for the JSS Region and Sector Operations Control Centers (ROCCs/SOCCs) is provided by Air Force Materiel Command, Wright-Patterson AFB OH. The prime contractor for the JSS ROCCs/SOCCs is Hughes Aircraft Corporation, Fullerton CA. Management of the JSS Connectivity is by the Electronic Systems Center, Air Force Materiel Command, Hanscom AFB MA. The prime contractor for the AICU is TRW, Aurora CO.

(U) Related Activities:
(U) Program Element #0102417F, (Over-the-Horizon Backscatter (OTH-B) Radar)
(U) Program Element #0102412F, (North Warning System (NWS))
(U) Program Element #0604725N, (Relocatable Over-the-Horizon Radar (ROTHR))
(U) Program Element #0207417F, (Airborne Warning And Control System (AWACS))

Program Element: #0102325F **Date:** February 1994
PE Title: Joint Surveillance System (JSS)
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #3 - Strategic Programs

(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3080, Budget Activity: 3 - Electronics and Telecom. Equipment, Program Title: JSS								
18,830	7,410	14,261	4,924	0	0	0	0	75.925

NOTE: All 3080 funds are Comm Elect Mods funding only.

(U) International Cooperative Agreements: The JSS-C program upgrades the JSS ROCCs/SOCCs as part of the North American Air Defense Modernization (NAADM) Memorandum of Understanding (MOU) signed in 1985 by the US Secretary of Defense and the Canadian Minister Defense. This allows Canada to implement cost-effective and operationally consistent changes to their JSS ROCCs.

2. (U) Project Number: 2996 Project Title: FAA/AF Radar Replacement (FARR):
The FAA/Air Force Radar Replacement (FARR) program will replace 39 existing JSS radars with solid-state, three-dimensional ARSR-4 radars to improve mission performance and reduce operation and maintenance costs. This includes technical radar site surveys and interface engineering in preparation for system installation, test, and check-out.

(U) FY 1993 Accomplishments:
- (U) Provided program office support. ($.300M)
- (U) Continued contractor system engineering support for FARR Joint PO (JPO). ($1.769M)
- (U) Provided engineering support for site preparation, radar production, installation, test, and system checkout. ($1.042M)
- (U) Completed site preparation. ($.600M)

Program Element: #0102325F **Date:** February 1994
PE Title: Joint Surveillance System (JSS)
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #3 - Strategic Programs

(U) FY 1994 Plans:
- (U) Provide PO support. ($.315M)
- (U) Continue contractor system engineering support for FARR JPO. ($1.138M)
- (U) Continue development of site design engineering packages. ($.500M)
- (U) Continue engineering support for site preparation, radar production, installation, test, and system checkout. ($.500M)
- (U) Provide interoperability evaluations and commissioning support. ($.100M)

(U) FY 1995 Plans:
- (U) Provide program office support. ($.352M)
- (U) Continue contractor system engineering support for FARR JPO. ($1.156M)
- (U) Continue engineering support for site preparation, radar production, installation, test, and system checkout. ($.600M)

(U) Work Performed By: The Federal Aviation Administration (FAA) is the lead acquisition agency for the FAA/AF Radar Replacement Program in accordance with a 19 November 1984 sub-agreement (as amended by Amendment #1, dated 1 September 1988) to FAA/AF National Agreement (NAT) 711. The FAA and the Air Force have established a Joint Program Office at HQ FAA, Washington DC, for this procurement. Westinghouse Corporation, Linthicum MD, is the prime contractor for the FARR program.

(U) Related Activities:
- (U) National Agreement 614 - Memorandum of Agreement (Amendment 2) between the FAA and the USAF for Joint Use of Air Defense Radar Assets Within the Continental United States, 1 Sep 88.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0102325F **Date:** February 1994
PE Title: Joint Surveillance System (JSS)
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #3 - Strategic Programs

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3080, Budget Activity: 3 - Electronics and Telecom. Equipment, Program Title: FARR								
40.857	82	392	329	161	111	0	0	23.475

NOTE: $1.4M of FY93 and all of FY94 - FY99 is Initial Spares funding.

(U) International Cooperative Agreements: None.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0102411F
PE Title: Surveillance Radar Stations/Sites (SRS)
Budget Activity : #7 - Operational System Development
Old Budget Activity : #3 - Strategic Programs

Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2980 North Atlantic Defense System (NADS)								
6,472	7,305	4,191	5,896	5,564	5,515	5,388	Continuing	TBD
Total								
6,472	7,305	4,191	5,896	5,564	5,515	5,388	Continuing	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element funds command, control and communications (C3) and air surveillance improvements in the North Atlantic. The NADS program provides improvements to C3 and surveillance capabilities in Iceland.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project Number: 2980 Project Title: North Atlantic Defense System (NADS):
The NADS program provides improvements to C3 and air surveillance capabilities in Iceland in support of air defense requirements in the strategically important Greenland-Iceland-Norwegian (G-I-N) gap Control and Reporting Center (CRC) improvements and new air surveillance radars are NATO Infrastructure funded. US funds remotely keyed cryptographic capabilities, systems engineering and integration activities for the total program according to a US-Iceland Memorandum of Understanding (MOU).

Program Element: #0102411F **Date:** February 1994
PE Title: Surveillance Radar Stations/Sites (SRS)
Budget Activity : #7 - Operational System Development
Old Budget Activity : #3 - Strategic Programs

(U) FY 1993 Accomplishments:
- (U) Provided program office support. ($2.112M)
- (U) Provided systems engineering support for IADS. ($4.360)

(U) FY 1994 Plans:
- (U) Provide program office support. ($2.550M)
- (U) Provide systems engineering support for IADS. ($4.755M)

(U) FY 1995 Plans:
- (U) Provide program office support. ($1.281M)
- (U) Provide systems engineering support for IADS. ($2.910M)

(U) Work Performed By: NADS is managed by the Electronic Systems Center, Air Force Materiel Command, Hanscom AFB MA. Technical support is provided by MITRE Corporation, Burlington MA; and Rome Air Development Center, Air Force Materiel Command, Griffiss AFB NY. Martin Marietta (formerly General Electric Corporation), Syracuse NY, is the contractor for the Iceland NATO Radar Subsystem. Hughes Aircraft Company, Fullerton CA, is the contractor for the Control and Reporting Center (CRC)/ Communication subsystem.

(U) Related Activities:
(U) Program Element #0102412F, (DEW Radar Stations)
(U) Program Element #0102325F, (Joint Surveillance System (JSS))
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0102411F
PE Title: Surveillance Radar Stations/Sites (SRS)
Budget Activity : #7 - Operational System Development
Old Budget Activity : #3 - Strategic Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3080, Budget Activity: 3 - Electronics and Telecom. Equipment, Program Title: NADS								
453	0	2,309	4,380	4,624	2,675	1,584	Continuing	TBD

(U) International Cooperative Agreements: NADS is a NATO Infrastructure program funded primarily with NATO funds. The cost sharing relationship is nominally 15/85 with US paying roughly 15% of total costs. US funds cryptographics capabilities, systems engineering, and integration activities for the total program according to a US-Iceland MOU.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0102412F
PE Title: DEW Radar Stations
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #3 - Strategic Programs

Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2710 North Warning System (NWS)								
2,444	2,578	2,068	2,043	1,873	1,828	1,784	Continuing	TBD
Total								
2,444	2,578	2,068	2,043	1,873	1,828	1,784	Continuing	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE provides air surveillance capability and tactical warning of bomber or cruise missile attack against the North American continent through a Distant Early Warning (DEW) Line extending from Alaska to Labrador. This warning provides the National Command Authorities with time for decision making and survival actions, permitting the launch of strategic retaliatory and command and control aircraft for survival, as well as the ability to alert air defense fighters to intercept attacking aircraft. Due to its age (1957 initial deployment), the DEW Line is increasingly difficult and costly to operate and maintain. The North Warning System (NWS) program replaces the aging DEW Line and will eliminate low-altitude coverage gaps, improve radar performance, and reduce operation and maintenance costs. RDT&E funds provide for the deployment, installation, integrations and testing of Unattended Radars (UARs) and Minimally Attended Radars (MARS) in order to rectify this deficiency. The continuing requirement for NWS coverage was revalidated by CINCNORAD in FY93. The NWS is a joint US/Canadian program with an FOC in late 1994. Research category is Operational Systems Development; development efforts support upgrades to currently operational systems.

Program Element: #0102412F
PE Title: DEW Radar Stations
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #3 - Strategic Programs

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project Number: 2710 Project Title: North Warning System (NWS):
A network of deployed Minimally Attended Radars (MARs) and to-be-deployed Unattended Radars (UARs) will provide tactical warning/attack assessment for northern air attack approaches to North America.

(U) FY 1993 Accomplishments:
- (U) Supported the deployment, installation, and integration of 19 UARs (one UAR ahead of schedule). ($1.564M)
- (U) Supported construction activities for 3 UAR sites in Alaska (approximately 70% complete). ($0.880M)

(U) FY 1994 Plans:
- (U) Continue program support for deployment and site integration for Canadian and Alaskan UAR systems - 21 sites. ($1.842M)
- (U) Activate UAR depot maintenance facility. ($0.736M)

(U) FY 1995 Plans:
- (U) Continue deployment/site integration. ($0.918M)
- (U) Support post-deployment activities, residuals, and contract deficiencies. ($1.150M)

(U) Work Performed By: This effort is managed by the Electronic Systems Center (ESC), Air Force Materiel Command, Hanscom AFB MA. MITRE Corporation, Burlington MA; Rome Air Development Center, Griffiss AFB NY; Analytical Systems Engineering Corporation (ASEC), Burlington MA; and the Electromagnetic Compatibility Analysis Center (ECAC), Annapolis MD; are providing technical support. UNISYS (formerly Paramax), Great Neck NY, was selected in FY91 as the production contractor for the Unattended Radar (UAR) and overall systems engineering. This contract was awarded as a follow-on to design technical competition. Canadian NWS efforts are managed by a Canadian program office located in Ottawa.

Program Element: #0102412F **Date: February 1994**
PE Title: DEW Radar Stations
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #3 - Strategic Programs

(U) Related Activities:
(U) Program Element #0102325F, (Joint Surveillance System (JSS))
(U) Program Element #0102411F, (Surveillance Radar Stations/Sites (SRS))
(U) Program Element #0102417F, (Over-the-Horizon Backscatter (OTH-B) Radar)
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3080, Budget Activity: 3 - Electronics and Telecom. Equipment, Program Title: NWS								
0	3,353*	0	5,886*	8,833*	0	0	0	18,072

NOTE: *Comm Elect Mods funds only - for modifications to AN/FPS-117 LRR.

(U) International Cooperative Agreements: The North Warning Program is the key element of North American Air Defense Modernization (NAADM) established by the March 1985 Memorandum of Understanding (MOU) between the United States and Canada, signed by Secretary of Defense Weinberger and Canadian Minister of Defense Nielson. The NAADM MOU established a cost sharing relationship of 60/40, with Canada responsible for 40 percent of total costs.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207129F
PE Title: F-111 Squadrons
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

	FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
2962 F-111 Avionics Modernization Program (AMP)	376	0	0	0	0	0	0	0	129,118
3079 F-111 Digital Flight Control System (DFCS)	6,895	2,285	0	0	0	0	0	0	67,167
1332 F-111 Crew Escape Module Parachute Replacement	400	1,890	1,004	0	0	0	0	0	12,962
1930 F-111 Stores Management System	19,968	21,504	10,015	5,073	0	0	0	0	56,560
Total	27,639	25,679	11,019	5,073	0	0	0	0	265,807

B. (U) BRIEF DESCRIPTION OF ELEMENT: The F-111 is the premier long range precision guided weapon delivery platform in the United States Air Force. This program provides funds to develop improved systems for the F-111 aircraft. These improvements maintain the weapon system as a safe, reliable, and maintainable aircraft. The F-111E and EF-111A model aircraft are currently planned to be in service throughout their service life, which is approximately 2018. The F-111F fleet will be retired over the next few years. RDT&E in this program element is operational systems development.

Program Element: 0207129F
PE Title: F-111 Squadrons
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 2962, Avionics Modernization Program (AMP): The F/FB-111 AMP is a low risk reliability/maintainability upgrade to the bomb navigation system of the F-111 E/F and EF-111A. This modification involves the substitution, modification and repackaging of 16 Line Replaceable Units in the following subsystems: Inertial Navigation System, Terrain Following Radar, Attack Radar, Doppler Radar, Controls and Displays and Data Transfer Unit. The AMP modification also raises the mean time between failure of the overall system from the current three hours to approximately 20 hours and will ensure system supportability through 2010 and beyond. The current phase of development deals with the design of Test Program Sets (TPSs) needed to achieve an organic repair capability at intermediate and depot levels, and independent validation and verification (IV&V) of the Avionics Intermediate Set Replacement (AIS-R) sets. In early 1988, an agreement was reached between Air Force Systems Command (AFSC) and Air Force Logistics Command (AFLC) specifying that Warner-Robins Air Logistics Center (ALC) would develop the TPSs. This agreement was based on anticipated savings in development costs and an earlier projected fielding date (as compared to contracting the effort with private industry) for the AMP TPSs.

(U) FY 1993 Accomplishments:
- (U) Completed LRU and SRU TPS development and IV&V, conducted warranty testing, and performed reliability evaluations ($376K).

(U) FY 1994 Plans: Not Applicable ($0).

(U) FY 1995 Plans: Not Applicable ($0).

Program Element: 0207129F
PE Title: F-111 Squadrons
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) Work Performed By: The F-111 Avionics Modernization Program contractors are General Dynamics Corporation, Ft. Worth, TX and Grumman Aerospace Corporation, Bethpage, NY. Development of the TPSs is being performed in-house by Warner-Robins ALC, GA. AIS-R IV&V is being performed by The Analytical Sciences Corporation.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
Appropriation APAF, Budget Activity 5 - Modification of In-Service Aircraft, Program Title - F-111 Squadrons								
1,100	0	0	0	0	0	0	0	899,700

(U) International Cooperative Agreements: Not applicable.

2. (U) Project 3079, Digital Flight Control System (DFCS): The DFCS is a permanent safety modification that replaces the electronic portion of the F/EF-111 flight control system with a modern state-of-the-art digital computer and sensors. This project will also improve the critical interfaces of the flight control system by incorporating the on-board autopilot and low altitude monitor and monitoring the terrain following radar systems. As a by-product of this safety modification, the system reliability of the flight control system will be improved from the current 60 hours to 673 hours.

Program Element: 0207129F
PE Title: F-111 Squadrons
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Continued testing on EF-111A aircraft, resolved service reports from kit proofing and flight test, began development of Test Program Sets (TPS), and completed EMI/EMC deficiencies flight test, including incorporating required changes ($6.896M).

(U) FY 1994 Plans:
- (U) Complete flight testing Ground Collision Avoidance (GCAS), Autopilot, and Landing Configuration Control System (LCCS) deficiencies, complete TPS development, and complete Engineering Change Proposals from test ($2.285M)

(U) FY 1995 Plans: None ($0).

(U) Work Performed by: The Digital Flight Control System (DFCS) contractor is General Dynamics, Ft Worth, TX. The F-111 System Manager is located at Sacramento Air Logistics Center, McClellan AFB, CA. The DFCS development effort is managed at Aeronautical Systems Division, Wright-Patterson AFB, OH.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: 0207129F
PE Title: F-111 Squadrons
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands):

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
Appropriation Aircraft and Procurement, Air Force and Modification (APAF), Budget Activity 5 - Modification of In-Service Aircraft, Program Title - F-111 Squadrons								
400	400	0	0	0	0	0	0	57,200

(U) International Cooperative Agreements: None.

3. (U) Project 1332, F-111 Crew Escape Module Parachute Replacement: Technical difficulties and financial concerns have forced termination of the Irvin Industries contract to develop a larger parachute. The FY 1994 program explores other alternatives to reduce back injuries during the ejection sequence. Alternatives include capsule weight reduction, adding a gliding characteristic to the 70' parachute, energy absorbing crew seats, and an improved attenuation bag. This is planned to be a one year effort to conclude this project. Further work on any promising alternatives will require initiation of a specific new program.

(U) FY 1993 Accomplishments:
- (U) Initiated expanded development phase, then canceled Irvin Industries development program on parachute ($400K)

(U) FY 1994 Plans:
- (U) Investigate alternatives to reduce ejection related back injuries and report results to ACC ($1.89M).

(U) FY 1995 Plans:
- (U) Complete contract termination ($1.004M).

Program Element: 0207129F
PE Title: F-111 Squadrons
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) Work Performed By: The described effort will be conducted by the F-111 System Manager located at Sacramento Air Logistics Center, McClellan AFB, CA.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
Appropriation APAF, Budget Activity 5 - Modification of In-Service Aircraft, Program Title - F-111 Squadrons								
0	0	0	0	0	0	0	0	700

(U) International Cooperative Agreements: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207129F
PE Title: F-111 Squadrons
Project Number: 1930
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 4 - Tactical Programs
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

	FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
1930 F-111 Stores Management System	19,968	21,504	10,015	5,073	0	0	0	0	56,560

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The existing SMS is failure prone and rapidly becoming unsupportable. This project will design, fabricate, and test a solid state weapon system controller and cockpit control panel and replace the release programming unit, central programming unit, and cockpit control panel in the F-111E/F. This modification will provide much needed reliability and maintainability improvements and provide a common SMS throughout the F-111 fleet. This modification also implements MIL-STD-1760, which will allow the F-111 to deliver the next generation of precision weapons. This program will increase the F-111 war fighting capability by eliminating inadvertent releases and release failures, and reduce operations and support costs. The decision to retire the F-111F has resulted in termination of this development. The termination includes canceling sub-contracts and eliminating the organic work force. Final termination costs are still being determined.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

(U) FY 1993 Accomplishments:
(U) Continued full scale development, conducted preliminary software and hardware design, conducted preliminary design review, and conducted software development for operational flight program support equipment ($19.968M)

(U) FY 1994 Plans:
- (U) Initiate program termination at Critical Design Review (CDR) and conduct program termination actions. Archive all deliverables from CDR. ($21.504M).

(U) FY 1995 Plans:
- (U) Conduct program termination actions ($10.015M).

(U) Program to Completion:
- (U) Complete program termination NLT FY 96. ($5.073M).

D. (U) WORK PERFORMED BY: This modification was being done organically by Sacramento Air Logistics Center.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Changes in user requirements led to the addition of three more stations using the MIL-STD-1760 bus.

2. (U) SCHEDULE CHANGES: Critical Design Review slipped two months while the Air Force was making force structure decisions.

3. (U) COST CHANGES: Program termination resulted in the elimination of all procurement funding. Costs of program termination actions are still being determined.

F. (U) PROGRAM DOCUMENTATION:

- (U) Tactical Air Command Configuration Control Board Approval, 11 May 90

G. (U) RELATED ACTIVITIES: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
Appropriation APAF, Budget Activity 5 - Modification of In-Service Aircraft, Program Title - F-111 Squadrons								
0	0	0	0	0	0	0	0	0

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE:

1. (U) Complete Critical Design Review — Feb 94
2. (U) Program Termination Actions — Mar 94 Until Complete

FY 1995 RDT&E DESCRIPTIVE SUMMARY

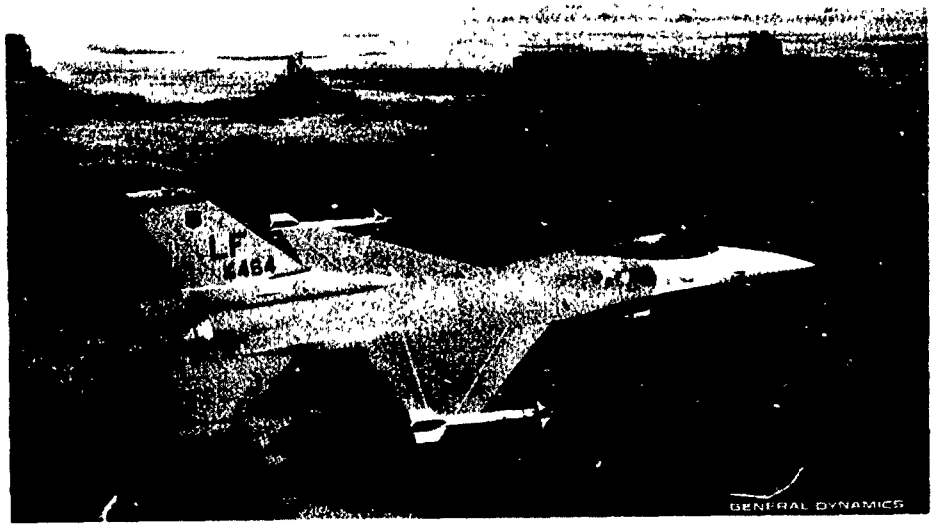
Program Element: 0207133F
PE Title: F-16 Squadrons

Project Number: 2671
Budget Activity: 7 Operational System Development
Old Budget Activity: 4 Tactical Programs

Date: February 1994

Project Title: F-16 Squadrons

F-16 FIGHTING FALCON



Program Element: 0207133F
PE Title: F-16 Squadrons
Project Number: 2671
Budget Activity: 7 Operational System Development
Old Budget Activity: 4 Tactical Programs
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

SCHEDULE	FY93	FY94	FY95	FY96	FY97	FY98	FY99	TO COMPLETE
Program Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Engineering Milestones	MLU PDR, MMMC SDR, BLK 50D FCA/PCA, BLK 50D 50T3SDR,JDAM OCD Complete	MLU HdWr CDR MMMC PDR, 50T3 PDR/CDR, BLK 50T4 SFR	BLK 50T3 FCA/PCA, BLK 50 T4 PDR/CDR, BLK 25/30 SW Update SCU-2, BLK 30/40 CAS SRR, MMMC & MLU CDR	F-16A/B SW Update Z2 FCA/PCA, BLK 30/40 CAS SFR/PDR, BLK 50T4 FCA/PCA, MLU	BLK 30/40 CAS CDR	MMMC FCA/PCA, BLK 50T5 PCA, SCU-4 FCA/PCA Complete MMMC T1	BLK 50T6 PCA	
T&E Milestones	Blk 50D Integration	Blk 50D Integration	On-going DT&E	On-going DT&E	On-going DT&E	On-going DT&E	On-going DT&E	On-going DT&E
Contract Milestones	Continue MLU, Continue MMMC	Continue MLU, MMMC, Start CAS	Continue MLU, MMMC & CAS	Continue MLU, MMMC & CAS	Continue MLU, MMMC & CAS	Continue MMMC & CAS		
BUDGET ($-Thousands)	**FY93**	**FY94**	**FY95**	**FY96**	**FY97**	**FY98**	**FY99**	**Budget Total [To Complete]**
Major Contract	96,900	48,382	80,576	159,231	46,436	60,944	95,306	1,683,417 [TBD]
Support Contract	0	0	0	0	0	0	0	232,600 [0]
In-House Contract	8,800	9,000	9,223	9,388	9,554	9,726	9,852	211,443 [TBD]
GFE/Other	3,709	3,547	3,358	3,251	3,288	3,207	3,353	106,162 [TBD]
Total	109,409	60,929	93,157	171,870	59,278	73,877	108,511	2,233,622 [TBD]

Program Element: 0207133F
PE Title: F-16 Squadrons
Project Number: 2671
Budget Activity: 7 Operational System Development
Old Budget Activity: 4 Tactical Programs
Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: There is a continuing need for modernization of the USAF and allied multimission tactical fighter forces. The F-16C/D is intended to fulfill these requirements. The F-16 is a single-engine, single-seat, multirole tactical fighter with full air-to-air and air-to-surface combat capabilities. It is employed in a complementary role to the F-15 in counter-air missions and as the primary aircraft in the surface attack role. This project includes tasks to develop, integrate, and qualify systems to enhance the overall performance of the F-16 in the accomplishment of its mission.

(U) These improvements are grouped into a comprehensive, cost-effective Multinational Staged Improvement Program (MSIP). They include expanded air combat identification capability, updated electronic warfare suite, and incorporation of improved communication identification equipment. In addition, this project develops enhanced night, under-the-weather attack capability in the air-to-ground role. Improvements include a higher maximum takeoff weight, improved air-to-air gun sight algorithms, digital flight controls, and improved pilot interface. Combat capability and versatility will be increased by integration of an Increased Performance Engine (IPE), and enhanced with the addition of advanced air-to-surface and air-to-air missiles and munitions. It develops air-to-ground capabilities for Close Air Support (CAS) including an improved laser spot tracker-equipped LANTIRN pod, a VHF anti-jam radio and an Improved Data Modem (IDM) for retrofit into Block 40 F-16C/D aircraft.

(U) The project also develops CAS enhancements for Block 30 C/D including Pave Penny, IDM, VHF anti-jam radio, and 30MM Gun Pod. To continue to meet the need beyond the turn of the century, a Mid-Life Update (MLU) of aircraft avionics will be conducted in concert with our European partners. MLU involves various mods to European F-16 A/B and all USAF Block 50 aircraft, including the Modified Modular Mission Computer (MMMC). The MMMC will extend the cost effective life of the F-16 through replacement of three line replaceable units (LRUs) and the addition of significant memory and processing growth provisions. The latest version of the F-16C/D will have significantly improved display processors, enabling increased pilot situational awareness. It will also have data link capability and fully integrate the targeting capability of the latest version of the High speed Anti-Radiation Missile (HARM), enabling the F-16 Block 50Ds to augment F-4G Wild Weasels in the Suppression of Enemy Air Defense (SEAD) role.

(U) The F-16 received Milestone III approval in FY 1977, is an operational aircraft and therefore the development activities in this PE are included in Budget Activity 7; Operational Systems Development.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   (U) - Continued MLU program EMD ($26.3M)
   (U) - Continued MMMC Upgrade for Block 50 ($87.4M)
   (U) - Initiate MLU production long lead (N/A--EPG funding)

NOTE: MMMC and MLU efforts depend on use of FY93 unobligated ATARS funds as directed by Congress.

Program Element: 0207133F
PE Title: F-16 Squadrons
Project Number: 2671
Budget Activity: 7 Operational System Development
Old Budget Activity: 4 Tactical Programs
Date: February 1994

2. (U) FY 1994 Planned Program:
   (U) - Continue MLU EMD (includes DTS) ($19.7M)
   (U) - Continue MMMC Upgrade for Block 50 ($29.3M)
   (U) - Initiate design of Main Fuel Shut Off Valve ($1.5)
   (U) - Initiate CAS Block 30/40 Risk Reduction Effort ($8M)
   (U) - Mission Support ($10.4)

NOTE: CAS effort uses FY93 witheld funds

3. (U) FY 1995 Planned Program:
   (U) - Continue MLU EMD (Install MLU kits in trial verification installation aircraft) ($16.0M)
   (U) - Continue MMMC computer upgrade ($26.4M)
   (U) - Start Block 30/40 CAS EMD ($37.1M)
   (U) - Mission Support ($13.7)

4. (U) Program to Completion:
   (U) - EPG MLU kit delivery, FY 1997 - FY 2000 (EPG funded)
   (U) - Retrofit MMMC computer into Block 50, FY 97 - FY 02 ($233.4M) (Appn 3010)
   (U) - Complete Block 30/40 CAS EMD ($91M)

D. (U) WORK PERFORMED BY: The F-16 System Program Office (SPO) of the Aeronautical System Center (ASC), Wright-Patterson Air Force Base OH, implemented a single manager organization as a selected program under the Integrated Weapon System Management (IWSM) program initiative. The F-16 Program Office has management responsibility for the total F-16 program including the F-16A/B program which had previously transferred to Odgen Air Logistics Center (Air Force Material Command) Hill Air Force Base UT. The F-16 System Support Director at Odgen Air Logistics Center is directly responsible to the F-16 System Program Director for overall system sustainment. The major contractors are Lockheed, Ft. Worth TX (airframe); Pratt & Whitney, East Hartford CT, General Electric, Evendale OH (engines), and Westinghouse, Baltimore MD (radar). Major manufacturers include Fabrique Nationale, Belgium (engine); SABCA/SONACA, Belgium (aft fuselage and wings); FOKKER, The Netherlands (center fuselage and assembly); TAI, Turkish Aerospace Industries, (mate through assembly); DAF, The Netherlands (landing gear); Per Udsen, Denmark (pylons and vertical fin); Konsberg, Vapenfabrikk, Norway (internal navigation set and fan drive module); and General Electrics Corporation, England (GEC) (heads-up display).

Program Element: 0207133F
PE Title: F-16 Squadrons
Project Number: 2671
Budget Activity: 7 Operational System Development
Old Budget Activity: 4 Tactical Programs
Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Developed a plan for alternative CAS upgrades to Block 40 (day/night) and Block 30 (day only) vice a Block 30 CAS/BAI (day/night) upgrade. F-16 tactical reconnaissance program was deleted with the termination of the Advanced Tactical Air Reconnaissance System (ATARS). **Number of F-16s procured in FY94 was reduced to 12 aircraft, and this will be the last USAF buy.**

2. (U) SCHEDULE CHANGES: Software FCA/PCA slipped from March 1997 to January 1998 for MMMC. CAS development on hold pending notification of Congress of USAF/OSD planned program. Expect to start by Mar 94.

3. (U) COST CHANGES: Added $32.6M in FY 95 for the CAS program. Reduced FY94 program for CAS and MMMC to account for use of FY93 unobligated funds (CAS, Night Precision Attack, ATARS) as directed by congress.

F. (U) PROGRAM DOCUMENTATION

(U) - PMD 6075 (70), F-16 Multimission Fighter, 15 Jun 93
(U) - F-16 APB, 15 Jul 93
(U) - DCP #120, LWF Prototype, 1 Nov 72
(U) - TAC ROC 303-76, F-16 Air Combat Fighter, 27 Feb 76
(U) - DCP 3 143, multipurpose Fighter (F-16) 8 May 78
(U) - TAF SON 28 Dec 78
(U) - F-16C/D TEMP, 22 Mar 91
(U) - TAF 303-76: F-16 SORD for the F-16 Block 50, 5 Aug 91
F-16 SORD for the F-16 Block 40, 16 Jul 91
(U) - Milestone IV CAS ADM, 28 Nov 90
(U) - TAF 310, ADF, 5 Aug 87

G. (U) RELATED ACTIVITIES:

Program Element: 0207133F
PE Title: F-16 Squadrons
Project Number: 2671
Budget Activity: 7 Operational System Development
Old Budget Activity: 4 Tactical Programs
Date: February 1994

(U) - PE #0207590F, SEEK EAGLE
(U) - PE #0604270F (3600) On-Board Electronics Weapons Simulator (OBEWS)
(U) - PE #0207597F (3010), OBEWS
(U) - PE #0604270F, Missile Warning System
(U) - PE #0604249F, Night Precision Attack
(U) - PE #0603742F, Combat Identification Technology
(U) - PE #0604218F, Engine Model Derivative Program
(U) - PE #0604268F, Aircraft Engine Component Improvement Program

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

(U) - Procurement :

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation BP10, Budget Activity #1, Combat Aircraft, Program Title F-16								
666,861	470,383	100,549	229,941	80,404	37,374	34,790	TBD	TBD
Appropriation BP16 (initial spares/new acquisition), Budget Activity #1, Combat Aircraft, Program Title F-16								
33,669	1,151	7,851	5,696	3,939	21,002	16,051	TBD	TBD
Quantity								
24	12	0	0	0	0	0	0	2201

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The MLU kit will be a major avionics upgrade to the current EPG F-16A/B inventory. The basic kit will include a core computer upgrade (MMMC), Digital Terrain System, APG-66 (V2) radar upgrade, Improved Data Modem, Global Positioning System, Advanced Identification Friend or Foe System, and Group A Provisions for Night Vision and Microwave Landing Systems. USAF RDT&E funding ($104M) for EMD has been budgeted to cover the five year EMD period. The production phase of the program is scheduled began in late 1993, with kit deliveries to commence in 1996 and continue through 2000. MMMC is a U.S. only developed program that directly supports this program, the Taiwan program, and the USAF Blk 50 program.

Program Element: 0207133F
PE Title: F-16 Squadrons
Project Number: 2671
Budget Activity: 7 Operational System Development
Old Budget Activity: 4 Tactical Programs
Date: February 1994

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
F-16A/B Improvements	Dec 76 to present	Extensive testing on ADF: improved A/A radar, ADF AIM-120 capability, AIM-7 capability, ADF/AMRAAM separations testing completed Jul 92, SEEK EAGLE & FMS OFP tests.
F-16C/D DT&E	Nov 82 to present	Airframe, and avionics testing related to Blk 30, 40, 50 improvements. Blk 50 P2 started Jan 92, Blk 40 Tape 4 started 1 Apr 92, Blk 40 SEEK EAGLE test on-going.
F-16C/D FOT&E	Jun 85 to present	Blk 40 IOT&E completed 30 Oct 89. Continued Blk 30 software update 1 & Blk 40 tape 3 testing.

T&E ACTIVITY (TO COMPLETION)

Event	Planned Date	Remarks
F-16A/B Improvements	Jan 92 to Dec 97	Continue tests on software updates for OFP & RADAR, SEEK EAGLE, Mid-Life Update
F-16C/D (MSIP)	Jul 92 to Dec 95	Continued airframe and avionics testing related to Blk 30, 40, and 50 aircraft: stability and control, IPE,SEEK EAGLE, avionics, ECM and ECCM.
F-16C/D IOT&E	Currently Inactive	Each major subsystem testing will depend on its development schedule.
F-16C/D FOT&E (AMRAAM, ALR-56M, ALE-47, LANTIRN, GPS & RLG)	Continuing	Continue Air Combat Command testing of Blk 40/42/50/52 subsystems

1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: # 0207134F
PE Title: F-15E Squadrons

Project Number: N/A
Budget Activity : # 7 - Operational Systems Development
Old Budget Activity: # 4 - Tactical Program

Date: February 1994

Program Element: # 0207134F
PE Title: F-15E Squadrons

Project Number: N/A
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: # 4 - Tactical Program

Date: February 1994

POPULAR NAME: F-15 EAGLE

A: (U) SCHEDULE/RESOURCES ($ in Thousands)

SCHEDULE	FY93	FY94	FY95	FY96	FY97	FY98	FY99	To Complete
Program Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Engineering Milestones	Ongoing Integration	Ongoing Integration	Ongoing Integration	Ongoing Integration	Ongoing Integration	Ongoing Integration	Ongoing Integration	Ongoing Integration
T&E Milestones	Ongoing Upgrades	Ongoing Upgrades	Ongoing Upgrades	Ongoing Upgrades	Ongoing Upgrades	Ongoing Upgrades	Ongoing Upgrades	Ongoing Upgrades
Contract Milestones	LANTIRN Integr	AFMSS, MSIP, VHSIC Integr	GPS, SFDR, I HUD, LANTIRN OFP Integr					

BUDGET ($000)	FY93	FY94	FY95	FY96	FY97	FY98	FY99	Budget Total (To Complete)
Major Contract	24,675	37,255	89,605	96,395	64,270	31,782	4,152	Continuing
Support Contract	6,690	9,650	7,300	6,700	4,900	3,600	2,300	Continuing
In-House Contract	14,768	18,924	19,657	24,400	5,400	8,400	10,100	Continuing
GFE/Other	3,300	0	0	0	0	0	0	Continuing
Total	49,433	65,829	116,562	127,495	74,570	43,782	16,552	Continuing

Program Element: # 0207134F
PE Title: F-15E Squadrons
Project Number: N/A
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: # 4 - Tactical Program
Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The F-15E is the most versatile fighter in the world today. Configured with conformal fuel tanks (CFTs), the F-15E can deploy worldwide with minimal tanker support and arrive combat-ready. The F-15E retains air superiority capability and adds systems, such as Low Altitude Navigation Targeting Infrared for Night (LANTIRN), to meet the requirement for all-weather, deep penetration, and night/under-the-weather, air-to-surface attack. However, the threat includes a new generation of aircraft possessing all-weather detection and kill capabilities. The F-15E's avionics, armament, airframe, and engines must be improved to maintain its superiority against the threat into the next century. Avionics updates, exploiting proven technological advances, are being incorporated into the F-15E providing expanded capability and supporting an updated and fully integrated electronic warfare suite. As a result, this project develops enhanced offensive and defensive capability and survivability. Additionally, overall combat capability is increased by integration of a Very High Speed Integrated Circuit (VHSIC) Central Computer (CC). (The F-15E PE also funds RDT&E activities for PE # 0207130, F-15A-D). The F-15E received contract award approval in FY84, is an operational aircraft and therefore the development activities in the PE are included in Budget Activity 7, Operational Systems Development

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Continued development and testing of the improvements initiated in FY 1992 and prior.
   - (U) - Continued flight test and RDT&E tasks associated with SEEK EAGLE, Tactical Electronic Warfare System (TEWS) integration, VHSIC CC development, Radio Frequency (RF) compatibility, advanced algorithm Electronic Counter-Counter Measures (ECCM), Ground Collision Warning System (GCWS), and LANTIRN integration.
   - (U) - Initiated integration of Global Positioning System (GPS), development & integration of Digital Mapping System (DMS), and software development & integration for the Air Force Mission Support System (AFMSS), F-15C APG-63 reliability and maintainability (R&M) upgrade program, F-15 missile launch envelopes project.
   - (U) - Completed contract award for supplemental 9 F-15E aircraft buy, APG-70 Eagle Century Plus and R&M Improvement study, ALE-45 Commodity Class Consignment, B-61 required assets available (RAA) delivery to operational base.
   - (U) - Continued implementation of Integrated Weapon System Management for F-15A-E.
   - (U) - Implemented F-15 award fee on production contract.

2. (U) FY 1994 Planned Program:
   - (U) - Continue development and testing of the improvements initiated in FY 1993 and prior.
   - (U) - Complete VHSIC CC retrofit to F-15E, GCWS and AFMSS fielding ($2.4M).
   - (U) - Continue flight test and RDT&E tasks associated with TEWS integration, RF compatibility testing, advanced algorithm ECCM, combat ID improvements, Standard Flight Data Recorder (SFDR), GPS, DMS, APG-63 R&M upgrade, and F-15 missile launch envelopes ($46.9M).
   - (U) - Continue development of Air Force organic support facilities and initiatives ($7.0M).

Program Element: # 0207134F
PE Title: F-15E Squadrons

Project Number: N/A
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: # 4 - Tactical Program

Date: February 1994

(U) - Release the first fully integrated Operational Flight Program (OFP) (ECP 2367) to include TEWS, AFMSS, GCWS, and LANTIRN enhancements ($9.5M).
(U) - Continue advanced weapons integration planning.
(U) - Initiate GPS upgrade for F-15A-D aircraft.

3. (U) FY 1995 Planned Program:
(U) - Continue development and testing of the improvements initiated in FY 1994 and prior.
(U) - Continue flight testing and RDT&E tasks associated with advanced algorithm ECCM ($5.0M), APG-63 R&M upgrade ($53.6M), and AFMSS ($2.0M).
(U) - Field Standard Flight Data Recorder (SFDR), GPS capability ($14.0M).
(U) - Release fully integrated OFP (ECP 2454) to include TEWS, LANTIRN, AGM-130A, SFDR, F-15 missile launch envelopes, Improved Heads Up Display (HUD) ($14.6M).
(U) - Continue development of Air Force organic support facilities and initiatives ($7.3M).

4. (U) Program to Completion:
(U) - Continue development and testing of the improvements initiated in FY 1995 and prior.
(U) - Continue flight testing and RDT&E tasks associated with RF compatibility, advanced algorithm ECCM, GPS, APG-63 R&M upgrade, DMS.
(U) - Continue development of Air Force organic support facilities initiatives. Achieve initial operational capability of F-15E Avionics Integrated Support Facility (ASIF).
(U) - Complete TEWS integration, advanced algorithm ECCM and combat identification (ID) improvements, GPS integration, DMS integration, APG-63 R&M radar upgrade, AFMSS integration.

D. (U) WORK PERFORMED BY: The F-15E development is managed by the F-15 System Program Office, Aeronautical Systems Center, Wright-Patterson Air Force Base OH. McDonnell-Douglas Corporation, St. Louis MO, is the prime contractor for development and production of the F-15 aircraft. Pratt & Whitney Division of the United Technology Corporation, West Palm Beach FL, is the engine contractor. Hughes Aircraft Company, Culver City CA, is the radar subcontractor to McDonnell-Douglas Corporation. Northrop Corporation, Rolling Meadows IL, is responsible for the ALQ-135 Internal Countermeasures System. Loral Corporation, Yonkers NY, is responsible for the ALR-56C Radar Warning Receiver. The major in-house developing organizations are Air Force Flight Test Center, Edwards AFB CA, Air Force Development Test Center, Eglin AFB FL, and Arnold Engineering Development Center, Tullahoma TN.

Program Element: # 0207134F
PE Title: F-15E Squadrons

Project Number: N/A
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: # 4 - Tactical Program

Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES:

(U) Added down-size tester development in FY93; rephased APG-63 R&M upgrade, OFP upgrades and flight testing.

F. PROGRAM DOCUMENTATION:
(U) - TAF ROC 9-68, Feb 68
(U) - DCP # 19, Rev C, May 77 as amended Feb 80
(U) - TAF SON 321-82, Jan 84
(U) - F-15E SORD, Jul 91; F-15E TEMP, Mar 90

G. RELATED ACTIVITIES:
(U) - F-15A-D under PE 0207130F.
(U) - TEWS for F-15 application developed in PE 0604270F.
(U) - LANTIRN developed for the F-15E under PE 0604249F.
(U) - Manned Destructive SEAD for F-15 developed in PE 0207136F.
(U) - Joint Direct Attack Munition (JDAM) integration in PE 0604618F.
(U) - There is no unnecessary duplication of effort within the Air Force or the Dept of Defense.

Program Element: # 0207134F
PE Title: F-15E Squadrons

Project Number: N/A
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: # 4 - Tactical Program

Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, (Includes BP 10 and BP 16 initial spares) Budget Activity 10328A, Program Title Aircraft Procurement								
42,653	33,191	26,638	18,526	24,064	33,586	21,309	Continuing	TBD
Appropriation 3010, Budget Activity 11328A, Program Title Aircraft Modification (BSA 0502, WAC F01500)								
301,320	268,325	201,100	50,748	106,732	187,358	179,601	Continuing	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
ALR-56C/ALQ-135 Band 3 Integration	Jan 91	Ongoing
F-15E SRAM-T Early Vibration Flight Test	Mar 91	Completed
First APG-70 Dual AMRAAM Launches	Sep 91	Two direct hits
F-15E TEWS Baseline Development Test	Sep 91	Started
MSOGS DT&E	Aug 91	Completed
F-15E GCWS (Start)	Nov 92	Ongoing
VHSIC DT&E	Feb 93	Completed
ECP 2367	Aug 93	Ongoing

Program Element: # 0207134F
PE Title: F-15E Squadrons

Project Number: N/A
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: # 4 - Tactical Program

Date: February 1994

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
SFDR DT&E	1Q FY94	6510 TW, Edwards AFB
MSIP VHSIC OT&E	2Q FY94	AWC, China Lake
AGM-130/Improved Data Link DT&E	2Q FY94	Eglin AFB
GPS DT&E	3Q FY94	6510 TW, Edwards AFB
Spin Departure Prevention DT&E	4Q FY94	6510 TW, Edwards AFB
F-15E TEWS Baseline OT&E (Start)	4Q FY95	AWC, China Lake
Digital Map System DT&E	4Q FY95	6510 TW, Edwards AFB
ECP 2454	4Q FY95	422 TES, Nellis AFB
ECP 2574	1Q FY97	422 TES, Nellis AFB
APG-63U DT&E	2Q FY97	6510 TW, Edwards AFB

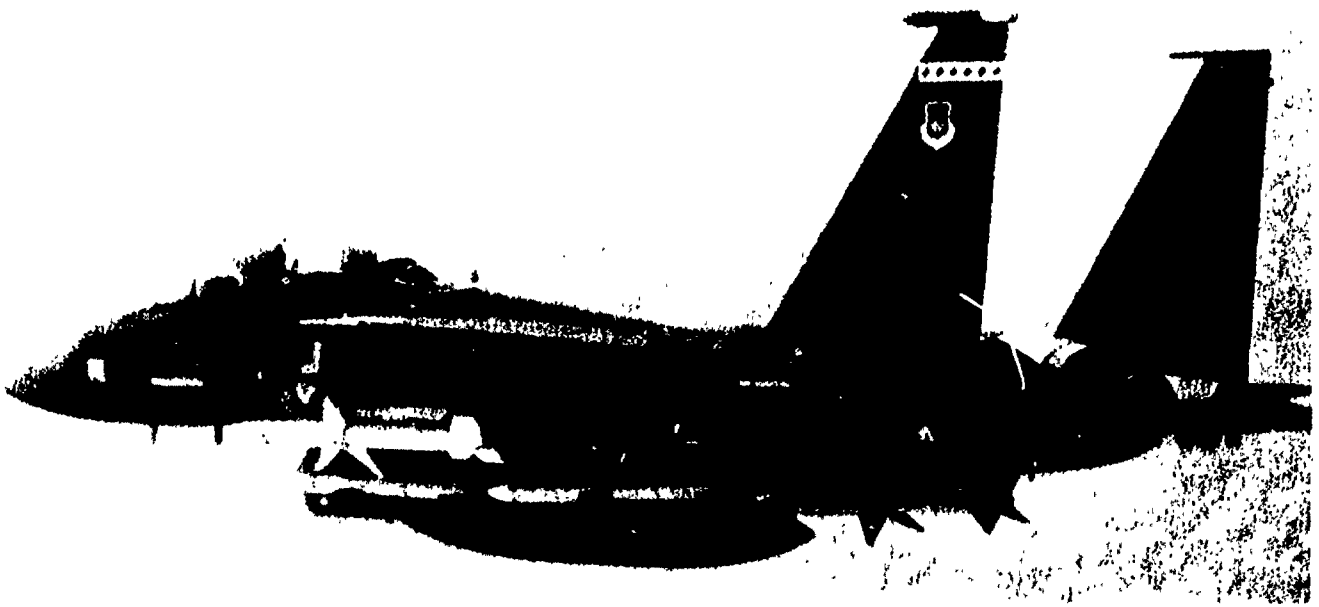
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: Manned Destructive Suppression of Enemy Air Defenses



POPULAR NAME: MDS

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

A. (U) SCHEDULE/BUDGET INFORMATION ($ In Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	HARM Int'n MS II (Jun)			PDF MS II (Oct 95)	HARM Int'n MS IIB (Oct 96)	HARM Int'n MS III (Sep)	PDF MS IIB (Sep)	PDF MS III (1Q02)
Engineering Milestones			HARM Int'n: PDR (Jun)	HARM Int'n: CDR (Jan) PDF PDR (Jun)	PDF CDR (Jan)			
T&E Milestones	HARM F-15E Vibration Flight Test (Nov)	HARM F-15C Qualification for STA 2/8 (Dec)			HARM DT&E starts (Jul)	HARM Int'n DT&E (Jan) OT&E starts (Mar)	HARM Int'n OT&E (Oct 98)	PDF DT&E (4Q00-3Q01) PDF OT&E (3Q01-1Q02)
Contract Milestones	HARM Int'n EMD Long-lead Award (Jul)	PDF Dem/Val Award (Apr)	HARM Int'n EMD Award (Jan)	PDF EMD Award (Jan)	HARM Int'n LRIP Award (Jan)		HARM Int'n Prod Award (Dec 98)	PDF LRIP Award (2Q00) Prod Award (2Q02)
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (ToComplete)**
Major Contract	6,700	4,050	34,122	45,407	49,831	48,836	41,583	283.4M (46,905)
Support Contract	(COEA) 700	100	700	950	1,000	1,000	800	6.4M (600)
In-House Contract	100	102	600	850	900	800	600	4.9M (400)
GFE/Other	862	100	3,000	3,000	900	700	450	9.5M (200)
Total	8,362	4,352	38,422	50,207	52,631	51,336	43,433	304.2M (48,105)

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides funds for the development and procurement of the Air Force's Manned Destructive Suppression of Enemy Air Defenses (MDSEAD) capability. The AGM-88 High-Speed Anti-Radiation Missile (HARM) is the primary munition for MDSEAD. The project provides the F-15 aircraft the capability to carry and employ the HARM. The F-15 will be modified with a Radio Frequency (RF) Precision Direction Finder (PDF) to allow real-time HARM employment. This overall capability is necessary due to the phase out of the F-4G Wild Weasel. As this program element provides for the development of upgrades to the F-15, an operational weapons system that has received Milestone III approval, funding is included in Budget Activity 7, Operational Systems Development.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:

(U) - Completed F-15E/HARM vibration flight test.	(Nov 92, $0.2)
(U) - Completed HARM Integration Dem/Val	(Jun 93, $0.8)
(U) - Began long-lead procurement & development for HARM Integration EMD.	($4.7)
(U) - Analyze alternatives for PDF and select candidate system(s).	(Jan 94, $0.8)
(U) - Continue Risk Reduction for PDF Dem/Val.	($1.2)
(U) - Began MS II PDF Cost & Operational Effectiveness Analysis (COEA).	($0.7)

2. (U) FY 1994 Planned Program:

(U) - Complete long-lead procurement & development for HARM Int'n EMD.	(Jan 94, $.2)
(U) - Begin PDF Demonstration/Validation.	($4.1)
(U) - Complete MS II PDF COEA.	(Dec 94, $0.1)

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

3. (U) FY 1995 Planned Program:

(U) - Begin HARM Integration EMD.	($17.0)
(U) - Continue PDF Demonstration/Validation.	($21.4)

4. (U) Program to Completion:

(U) - Complete PDF Demonstration/Validation.	(Dec 95, $2.5)
(U) - Integrate Operational Flight Program (OFP) onto F-15 for HARM Integration	(Dec 96, $1.2)
(U) - Complete HARM Integration EMD, including DT&E.	(Jan 98, $49.8)
(U) - Complete PDF EMD & DT&E.	(3Q01, $191.8)

D (U) Work Performed By: Air Force Materiel Command, Aeronautical Systems Center, F-15 Program Office, Wright-Patterson AFB, OH, is responsible for development. McDonnell Douglas Aerospace, St. Louis, MO, is the primary contractor for the F-15 HARM carriage and HARM targeting device efforts. Texas Instruments, Lewisville, TX, produces the AGM-88 HARM. Vendor selection for the sub-components is currently in process.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) Technical: Air Force leadership has determined the need to switch the MDSEAD mission from the F-15E to the F-15C. The PDF portion of the MDSEAD program is under Air Staff review. Expect candidate system(s) for the F-15C to be selected in Feb 94.

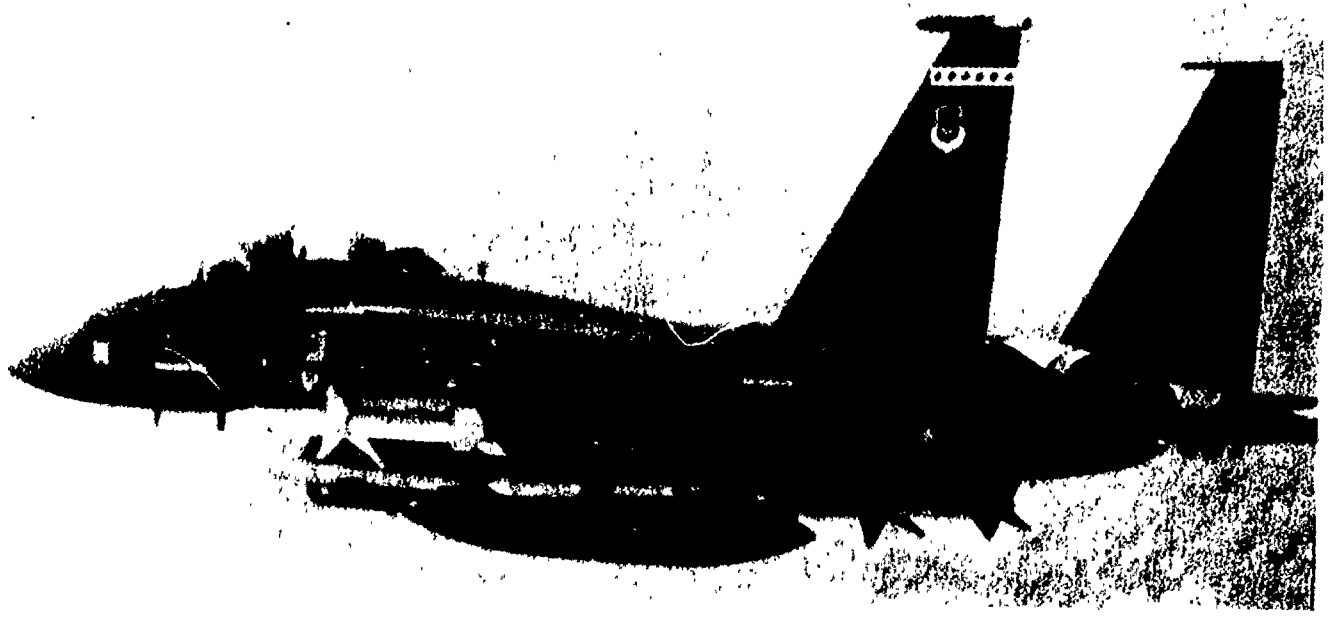
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: Manned Destructive Suppression of Enemy Air Defenses



POPULAR NAME: MDS

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

A. (U) SCHEDULE/BUDGET INFORMATION ($ In Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	HARM Int'n MS II (Jun)			PDF MS II (Oct 95)	HARM Int'n MS IIB (Oct 96)	HARM Int'n MS III (Sep)	PDF MS IIB (Sep)	PDF MS III (1Q02)
Engineering Milestones			HARM Int'n: PDR (Jun)	HARM Int'n. CDR (Jan) PDF PDR (Jun)	PDF CDR (Jan)			
T&E Milestones	HARM F-15E Vibration Flight Test (Nov)	HARM F-15C Qualification for STA 2/8 (Dec)			HARM DT&E starts (Jul)	HARM Int'n DT&E (Jan) OT&E starts (Mar)	HARM Int'n OT&E (Oct 98)	PDF DT&E (4Q00-3Q01) PDF OT&E (3Q01-1Q02)
Contract Milestones	HARM Int'n EMD Long-lead Award (Jul)	PDF Dem/Val Award (Apr)	HARM Int'n EMD Award (Jan)	PDF EMD Award (Jan)	HARM Int'n LRIP Award (Jan)		HARM Int'n Prod Award (Dec 98)	PDF LRIP Award (2Q00) Prod Award (2Q02)
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (ToComplete)**
Major Contract	6,700	4,050	34,122	45,407	49,831	48,836	41,583	283.4M (46,905)
Support Contract	(COEA) 700	100	700	950	1,000	1,000	800	6.4M (600)
In-House Contract	100	102	600	850	900	800	600	4.9M (400)
GFE/Other	862	100	3,000	3,000	900	700	450	9.5M (200)
Total	8,362	4,352	38,422	50,207	52,631	51,336	43,433	304.2M (48,105)

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides funds for the development and procurement of the Air Force's Manned Destructive Suppression of Enemy Air Defenses (MDSEAD) capability. The AGM-88 High-Speed Anti-Radiation Missile (HARM) is the primary munition for MDSEAD. The project provides the F-15 aircraft the capability to carry and employ the HARM. The F-15 will be modified with a Radio Frequency (RF) Precision Direction Finder (PDF) to allow real-time HARM employment. This overall capability is necessary due to the phase out of the F-4G Wild Weasel. AS this program element provides for the development of upgrades to the F-15, an operational weapons system that has received Milestone III approval, funding is included in Budget Activity 7, Operational Systems Development.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:

(U) - Completed F-15E/HARM vibration flight test.	(Nov 92, $0.2)
(U) - Completed HARM Integration Dem/Val	(Jun 93, $0.8)
(U) - Began long-lead procurement & development for HARM Integration EMD.	($4.7)
(U) - Analyze alternatives for PDF and select candidate system(s).	(Jan 94, $0.8)
(U) - Continue Risk Reduction for PDF Dem/Val.	($1.2)
(U) - Began MS II PDF Cost & Operational Effectiveness Analysis (COEA).	($0.7)

2. (U) FY 1994 Planned Program:

(U) - Complete long-lead procurement & development for HARM Int'n EMD.	(Jan 94, $.2)
(U) - Begin PDF Demonstration/Validation.	($4.1)
(U) - Complete MS II PDF COEA.	(Dec 94, $0.1)

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

3. (U) FY 1995 Planned Program:

(U) - Begin HARM Integration EMD.	($17.0)
(U) - Continue PDF Demonstration/Validation.	($21.4)

4. (U) Program to Completion:

(U) - Complete PDF Demonstration/Validation.	(Dec 95, $2.5)
(U) - Integrate Operational Flight Program (OFP) onto F-15 for HARM Integration	(Dec 96, $1.2)
(U) - Complete HARM Integration EMD, including DT&E.	(Jan 98, $49.8)
(U) - Complete PDF EMD & DT&E.	(3Q01, $191.8)

D (U) Work Performed By: Air Force Materiel Command, Aeronautical Systems Center, F-15 Program Office, Wright-Patterson AFB, OH, is responsible for development. McDonnell Douglas Aerospace, St. Louis, MO, is the primary contractor for the F-15 HARM carriage and HARM targeting device efforts. Texas Instruments, Lewisville, TX, produces the AGM-88 HARM. Vendor selection for the sub-components is currently in process.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) Technical: Air Force leadership has determined the need to switch the MDSEAD mission from the F-15E to the F-15C. The PDF portion of the MDSEAD program is under Air Staff review. Expect candidate system(s) for the F-15C to be selected in Feb 94.

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

2. (U) Schedule: Long-lead Programmable Armament Control Set (PACS) modification to support HARM Integration development efforts will continue into FY95 due to the change in platform. Much of the work already accomplished on the F-15E is transferable to the F-15C. This commonality will minimize the impact of program changes on the HARM Integration phase. HARM Integration EMD delayed one year due to program restructuring. PDF Dem/Val efforts will begin in Apr 94.

3. (U) Cost: During the period from Mar to Sep 93, the F-15 System Program Office (SPO) refined the MDSEAD program cost estimates. The refinement of the estimates was due to the evolution of more mature product definition and the rebaseline from the F-15E to the F-15C.

F. (U) PROGRAM DOCUMENTATION:
(U)- SON, 8/91.
(U)- ORD, 3/92.
(U)- APB, 3/93
(U)- STA/TEMP, 6/93

G. (U) RELATED ACTIVITIES:
(U)- PE 0207126F, High-Speed Anti-Radiation Missile.
(U)- PE 0207130F, F-15A/D Squadrons.
(U)- PE 0207134F, F-15E Squadrons.
(U)- There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

Program Element: 0207136F
PE Title: Manned Destructive Suppression of Enemy Air Defenses

Project Number: 3777
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation APAF, Budget Activity #5 Modifications, Program Title Manned Destructive Suppression (MDS)								
0	0	0	5,660	3,286	10,264	32,666	201.2M	253.2M

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

	Event	Date	Results
(U)	F-15E HARM Vibration Flight Testing	Nov 92	Exceeded HARM Qualified Levels
(U)	F-15E Wind Tunnel Testing	Jul 93	ASC/VFA Granted Flight Clearance
(U)	HARM Requalification for STA 2/8	Dec 93	HARM Requalified for F-15C stations 2/8

T&E ACTIVITY (TO COMPLETION)

	Event	Date	Results
(U)	HARM Integration DT&E	4Q98	TBD
(U)	HARM Integration OT&E	1Q99	TBD
(U)	PDF DT&E	4Q00	TBD
(U)	PDF OT&E	2Q01	TBD

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207141F
PE Title: F-117A Squadrons
Budget Activity: #7 - Operation Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
F-117A STEALTH FIGHTER								
1,224	6740	0	1,430	12,549	9,938	10,695	continuing	2,070,372

B. (U) BRIEF DESCRIPTION OF ELEMENT: The F-117A is the world's only operational low-observable (LO) combat aircraft. Its combination of stealth and precision weapons delivery capability allows the United States Air Force to hold even the most highly defended targets at risk. This program provides funds to develop improved systems for the F-117A aircraft. These improvements will enhance combat capability while maintaining a safe, reliable, and supportable aircraft. The F-117A is currently planned to be in service at least through the year 2018. This PE is included in budget activity 7 which provides for the development of enhancements to the F-117A which is an operational aircraft. The category of research is operational systems development work. The final F-117A delivery to the Air Force (number 59) was July 1990. The program is well past production; currently the 49 FW is stationed at Holloman AFB. The program uses Aircraft Procurement Air Force (APAF) modification (BA-5) money for an extensive mod program to keep the F-117A current with operational system and reliability/maintainability upgrades. However any mods started before FY92 with APAF Other Production Charges money continues on with that type of funding. Some of the mod projects require development efforts before they're integrated into the fleet (RDT&E money). In addition small amounts of F-117A RDT&E funding supports quick look integration, threat system, and technology quick look studies as required by the user.

Program Element: #0207141F **Date: February 1994**
PE Title: F-117A Squadrons
Budget Activity: #7 - Operation Systems Development
Old Budget Activity: #4 - Tactical Programs

(U) FY 1994 Plans:
- (U) Issue F-117A AFMSS Phase II contract, CLOAR & A/W/E work ($4,600)
- (U) Continue (RNIP+) work ($300)
- (U) Support initial integration and testing of specialized communication work ($200)
- (U) OFP software maintenance for next software upgrade, OFP 65 ($100)
- (U) DT&E testing of lower enhancer ($200)
- (U) Support initial integration and testing use of DIR at 49 FW ($200)
- (U) Miscellaneous efforts ($1,036)

(U) FY 1995 Plans: Not Applicable, no FY95 funding programmed.

(U) CHANGES FROM FY 94 PB: The total change for RDT&E F-117A funding from FY94 PB to FY95 PB was a reduction of $4.1M. The FY94 PB to FY95 PB changes by year are (-$1.2M)FY96, (-$7.1M)FY97, (-$0.9M)FY98, and (+$5.1M)FY99. A summary of the changes follows: The Offensive Capabilities Improvement Program (OCIP) Mod (funded by aircraft procurement) upgrades avionic cockpit displays and the digital tactical situation display, improves the autopilot, and incorporates an automatic aircraft recovery system. $2.0M FY97 development funds for OCIP avionics fixes were deleted; development for the common mapping system (CMS) upgrade to AFMSS was moved out two years from (FY97-$4.7M, FY98-$3.8M) to FY99 & FY00 (no reduction of funds) to better align with the AFMSS schedule and HQ ACC's desires to have CMS for all aircraft and to take advantage of the F-15 contract to reduce overall costs; development for specialized communication work on the LO UHF antenna was moved out two years from ($2.0M-FY96, $2.8M-FY97) to FY98 & FY99 (no reduction of funds) due to a decision to slip this mod out to accommodate budget cuts. Development work on life limited skin panel replacement was slipped out three years from ($0.8M-FY94, $0.2M-FY95) to ($1.5M-FY97, $0.2M-FY98) since this was not a safety of flight impact but more funds are requested due to an increase in the numbers of affected panels; and the development of a replacement of current halon fuel tank inerting system with a nitrogen generating system as part of eliminating ozone depleting chemicals was slipped out two years ($1.2M-FY95) to FY97 (no reduction of funds) since the fuel tank inerting system is only used during war time operations; and development work on a new RAM recoating was moved up one year from ($1.6M-FY97, $4.3M-FY98) to FY96 & FY97 (no reduction of funds) to align the work with the existing RNIP+ mod effort.

Program Element: #0207141F
PE Title: F-117A Squadrons
Budget Activity: #7 - Operation Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) Project 3956, F-117A: This project currently provides research and development for multiple modifications for the F-117A weapons system. The first modification enables a transition from the current Mission Planning Data System (MDPS) through development of the F-117A Avionics Electronics Weapons (A/W/E) module to interface with the new Air Force Mission Support System (AFMSS), which will become the USAF standard planning system. This also includes development of a common low observable auto-router (CLOAR) for AFMSS (managed by ESC/YV). The second modification is the development of new panels and supports to replace areas of the aircraft skin that have been analytically determined to have a service life less than that of the basic aircraft. The third mod effort is the development of a new fuel tank inerting system which will conform to environmental standards. The current aircraft inerting system uses halon, an ozone layer depleting chemical which is being withdrawn from service. Fourth is the development and field installation of a diagnostic imaging radar (DIR) to help maintain signature levels at baseline specification values. Fifth is the Development Testing and Evaluation (DT&E) testing of the lower enhancer effectiveness in the lower bands. Sixth is operational flight program (OFP) software maintenance. Seventh is developmental work done for the Ring Laser Navigation Improvement Plus (RNIP+) mod which also will modify the control display navigation unit (CDNU) to support the installation of GPS with RNIP+. Eighth is developmental work associated with efforts to fabricate and install specialized communications gear, MIL-STD 1760, and new Radar Absorbant Material (RAM) recoating. Miscellaneous efforts are work for the Infrared Acquisition and Designation System (IRADS) upgrade; work on improvement of the aircraft's survivability against future low-frequency threats, work on support equipment upgrades; and quick look integration, threat system, and technology quick look studies as required by the user.

(U) FY 1993 Accomplishments:
- (U) (RNIP+) work ($150)
- (U) Specialized communications work ($150)
- (U) Completed Aircraft/Weapons/Electronics (A/W/E) Phase I contract for AFMSS ($100)
- (U) Preliminary environmental survey tests for life limited skin panels ($300)
- (U) Demonstrated hollow membrane fuel tank inerting concepts on F-117A ($300)
- (U) Miscellaneous efforts ($224)

Program Element: #0207141F
PE Title: F-117A Squadrons
Budget Activity: #7 - Operation Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) WORK PERFORMED BY: Prime contractor is Lockheed Advanced Development Company, Burbank, CA. Some development work will be performed by Wright Labs, Aeronautical Systems Center, Wright-Patterson AFB, OH. The F-117A System Program Director is located at Sacramento Air Logistics Center, McClellan AFB, CA. The F-117A Development System Program Office is located at Wright-Patterson Air Force Base, OH.

(U) RELATED ACTIVITIES: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Aircraft Procurement (Appn 3010, BA-5, F-117A Squadrons):								
138,262	132,015	63,747	60,899	51,751	59,772	56,577	continuing	4,890,014
Other Procurement (Appn 3080, BA-5, F-117A Squadrons):								
542	574	1,602	494	513	526	544	continuing	13,595
Operations and Maintenance (Appn 3400, F-117A Squadrons):								
194,600	215,428	222,773	223,833	213,623	220,716	227,143	continuing	2,987,916

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207160F
PE Title: Tri-Service Standoff Attack Missile (TSSAM)

Project Number: 8726 **Date:** February 1994
Budget Activity: 7, Operational System Development
Old Budget Activity: 4, Tactical Programs

Project Title: Tri-Service Standoff Attack Missile (TSSAM)

Photo Not Available

POPULAR NAME: TSSAM

A. (U) **SCHEDULE/BUDGET INFORMATION ($ in Millions):**

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY1998	FY1999	To Complete
Program Milestones		CEB LL (May)	CEB LRIP (May)	UN LL (May)	UN LRIP 2Q97		UN MS III 2Q99	
					MSIII AF-CEB			
Engineering Milestones			CEB FCA/PCA					
			UN FCA/PCA					
T&E Milestones		CEB DT End	CEB OT&E	UN OT	END EMD FLIGHT TEST			
		UN DT Start	UN DT End					
Contract Milestones						EMD Contract End		

Note: All events refer to Air Force - CEB = Combined Effects Variant - UN= Unitary Warhead Variant

Program Element: 0207160F
PE Title: Tri-Service Standoff Attack Missile (TSSAM)

Project Number: 8726 **Date:** February 1994
Budget Activity: 7. Operational System Development
Old Budget Activity: 4. Tactical Programs

BUDGET ($000)	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY1999	To Complete	Total
Major Contract	Note 1	183,590	19,620	29,424	13,422	7,481	0	0	1,660,051
Support Contract	Note 1	2,000	2,100	2,200	1,800	1,500	0	0	12,900
In-House Contract	Note 1	5,000	5,100	4,900	4,600	4,500	0	0	55,500
GFE/Other	Note 1	74,794	54,243	37,682	29,052	7,070	16,610	0	479,614
Total	Note 1	265,384	81,063	74,206	48,874	20,551	16,610	0	2,208,065

Note 1: FY93 and previous years' funding remains Special Access Required

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Tri-Service Standoff Attack Missile (TSSAM) is a joint service program with the Air Force as the executive service. The program objective is to develop a family of highly survivable, conventional, stealthy cruise missiles which will satisfy tri-service requirements to effectively engage a variety of high-value land and sea targets. The technical approach is to develop a modular stealthy cruise missile which: can employ several payloads and guidance systems to engage the required targets, emphasizes commonalty and producibility to reduce costs, and can be integrated with a variety of launch platforms. All variants use a GPS-aided inertial navigation system. The Navy and the Air Force (unitary variant) missiles use an imaging infrared terminal sensor for autonomous recognition and homing on fixed land targets and sea targets. The other Air Force variant contains Combined Effects Bomblets (CEB) submunition to attack land targets. The Air Force plans to integrate the missile with the B-52H, F-16C/D (Block 50), B-2, and B-1. The Navy plans to integrate the missile with the F/A-18C/D. TSSAM is an "Operational Systems Development" (Research Category 6.7) program. The program described in this Descriptive Summary completes Engineering and Management Development, begins production and achieves Initial Operational Capability.

Program Element: 0207160F
PE Title: Tri-Service Standoff Attack Missile (TSSAM)

Project Number: 8726 **Date:** February 1994
Budget Activity: 7, Operational System Development
Old Budget Activity: 4, Tactical Programs

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

(U) NOTE: The TSSAM test program specifics remain Secret - Special Access Required (SAR) per the 31 March 1993 Program Security Guide. Separate justification will be provided to appropriately cleared individuals.

1. (U) FY1993 Program (FY93 funding will be provided to appropriately cleared individuals)
   - (U) - 31 month Engineering, Manufacturing and Development (EMD) schedule extension approved by DAB Nov 92
   - (U) - Removed requirement for second source assembler, Aug 93
   - (U) - 7 flight test events: 3 Air Force, 2 Army, and 2 Navy
   - (U) - 5 Successful, 2 unsuccessful flights, (one Army variant and one Navy variant)

2. (U) FY1994 Planned Program
   - (U) - Continue EMD on Northrop prime contract (ECD: FY98) ($158M)
     - -- Start CEB Munitions Dispense System (MDS) redesign
     - -- Negotiate Sensor Request for Equitable Adjustment (REA)
   - (U) - Continue platform integration development on B-52H and F-16C (ECD: FY97) ($26M)
   - (U) - Award Air Force Mission Support System development contract (ECD: FY98) ($9M)
   - (U) - Continue flight testing and begin B-52 unitary testing (ECD: FY97) ($48M)
   - (U) - Continuance of associate/support contractors and program office mission support (ECD: FY99) ($24M)

3. (U) FY1995 Planned Program
   - (U) - Continue EMD on prime contract and launch platform contracts (ECD: FY98) ($20M)
   - (U) - Continue AFMSS development contract (ECD: FY98) ($7M)
   - (U) - Continue flight test program (ECD: FY97) ($37M)
     - -- Start development testing on B-2 (ECD: FY96)
     - -- Complete development testing on B-52 and F-16
     - -- Accomplish operational testing on B-52 with CEB variant (ECD: FY96)
   - (U) - Continuance of associate/support contractors and program office mission support (ECD: FY99) ($17M)

4. (U) Program to Completion
   - (U) - Continue EMD on prime contract and launch platform contracts (ECD: FY98) (Estimate: $50M)
   - (U) - Continue AFMSS development contract (ECD: FY98) (Estimate: $24M)
   - (U) - Continue flight test program (ECD: FY98) (Estimate: $44M)
     - -- Accomplish operational testing on B-52 with unitary variant (ECD: FY97)
     - -- Complete live fire testing
   - (U) - Continuance of associate/support contractors and program office mission support (ECD: FY99) (Estimate: $42M)

Program Element: 0207160F
PE Title: Tri-Service Standoff Attack Missile (TSSAM)

Project Number: 8726 **Date:** February 1994
Budget Activity: 7. Operational System Development
Old Budget Activity: 4. Tactical Programs

D. (U) WORK PERFORMED BY: Prime Contractor is Northrop Aircraft Division, Hawthrone CA. The government developing organization is the Tri-Service Attack Standoff Missile (TSSAM) Joint System Program Office, located at Aeronautical Systems Center, Wright Patterson Air Force Base, Ohio.

E. (U) COMPARISON WITH FY1994 DESCRIPTIVE SUMMARY:
EXPLANATION: FY94 and prior TSSAM documentation was submitted through annual Special Access Program (SAP) reports.

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: Approved a 31 month extension to the EMD schedule on 2 Nov 92 approved moving Long Lead decision and LRIP from February to not later than June 1994 and 1995 respectively. Budget constraints moved Unitary version production start date out by one year to FY97 and slowed production ramp to minimum sustaining.

3. (U) COST CHANGES: New Joint Program Office Estimate completed in August 1993. Production unit cost increased as a result of budget deliberations. The Air Force moved to a minimum sustaining ramp rate and reduced the quantity to 4000. Army withdrew from TSSAM; Navy reduced quantity to 525 (vice 1050) and moved production decision two years to right (FY98)

F. (U) PROGRAM DOCUMENTATION:

- Joint Services Operational Requirement	7/91
- Test and Evaluation Master Plan (TEMP)	7/93 (Service Approved)
- System Threat Assessment Report (STAR)	4/93

G. (U) RELATED ACTIVITIES:
- This is an Air Force lead Joint Program.
- Army PE is 64315A, Navy PE is 064312N.
- A Joint Army, Navy, Air Force Program Management Charter (May 93) exists for the TSSAM program. This charter outlines the service responsibilities, the program office responsibilities and the funding requirements for the Services. There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: 0207160F
PE Title: Tri-Service Standoff Attack Missile (TSSAM)

Project Number: 8726 **Date:** February 1994
Budget Activity: 7, Operational System Development
Old Budget Activity: 4, Tactical Programs

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

AIR FORCE ONLY

	FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation: Aircraft Procurement (3010), Budget Activity #5, Modifications, Program Title: Tri-Svc Stdoff Atk Msl									
See Note 1,	9,358	0	0	0	0	0	35,639		65,697
Appropriation: Missile Procurement (3020), Budget Activity #2, Other Msls Program Title: Tri-Svc Stdoff Atk Msl									
See Note 1	159,570	376,930	390,133	436,705	498,534	478,722	4,224,100		6,576,194
Appropriation: Other Procurement (3080), Program Title: Tri-Svc Standoff Attack Msl									
See Note 1	0	0	0	0	0	0	0		21,400
Appropriation: MILCON (3300), Program Title: Tri-Svc Standoff Attack Msl									
See Note 1	0	0	7,600	0	15,900	5,700	0		44,087
Appropriation: Operations and Maintenance (3400), Program Title: Tri-Svc Standoff Attack Msl									
See Note 1	0	0	0	40,208	40,881	24,994	1,888,800		1,994,883

Note 1: FY93 and previous years' funding broken out by year remains classified Secret - Special Access Required

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
(U) Eight Air Force development test events were flown in the last 36 months, 5 were successful and 3 were unsuccessful:		
(U) FF-5 B-52 CEB	Jun 93	Successful
(U) FF-4 B-52 CEB	Mar 93	Successful
(U) FF-3 B-52 CEB	Oct 92	Successful
(U) FF-2 B-52 CEB	Jun 92	Successful
(U) FF-1R3 C-130 (non-munitioned)	Dec 91	Successful

Program Element: 0207160F
PE Title: Tri-Service Standoff Attack Missile (TSSAM)

Project Number: 8726 **Date:** February 1994
Budget Activity: 7, Operational System Development
Old Budget Activity: 4, Tactical Programs

(U) FF-1R2 B-52 (non-munitioned)	Aug 91	Unsuccessful
(U) FF-1R1 B-52 (non-munitioned)	Mar 91	Unsuccessful
(U) FF-1 (non-munitioned)	Dec 90	Unsuccessful

T&E ACTIVITY (NEXT 36 MONTHS) - AIR FORCE ONLY

Event	Date	Remarks
(U) AF CEB Developmental Testing Complete	FY94	
(U) AF UNITARY Developmental Testing Start	FY94	
(U) AF CEB Operational Testing	FY95	
(U) AF UNITARY Operational Testing	FY96	
(U) EMD Phase complete	FY98	

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207161F
PE Title: Tactical Air Intercept Missile (AIM)

Project Number: 4132
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: AIM-9 Product Improvement

Photo Not Available

Program Element: 0207161F
PE Title: Tactical Air Intercept Missile (AIM)

Project Number: 4132
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

POPULAR NAME: AIM-9X

A. (U) **SCHEDULE/BUDGET INFORMATION ($ in Thousands):**

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones		Milestone IV/I Aug/FY94		Milestone II Jan/FY96				Milestone III Oct/FY02
Engineering Milestones			SRR Dec/FY95	SDR Nov/FY96	PDR Oct/FY97 CDR May/FY97		TRR for TECHEVAL Apr/FY99	
T&E Milestones		DT-I Sep/FY94	Fly Brassboards Jun/FY95	Begin DT-IIA Apr/FY96		Begin DT-IIB Oct/FY98	Begin OT-IIA Dec/FY99	OPEVAL Report Sep/FY01
Contract Milestones		Award (DEMVAL) Sep/FY94	Release RFP for EMD Jul/FY95	Award (EMD) Mar/FY96				Award (Production) Nov/FY02
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**F 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract			18,077	15,849	20,429	21,189	23,091	Continuing
Support Contract								
In-House Contract	*	*	8,867	6,143	11,036	11,446	10,866	Continuing
GFE/Other				TBD				Continuing
Total	*	*	26,944	21,997	31,465	32,635	33,957	Continuing

Program Element: 0207161F
PE Title: Tactical Air Intercept Missile (AIM)
Project Number: 4132
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

* FY 199 and FY 1994 funded in OSD Program Element #0603715D.

B.(U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The AIM-9 is a short-range, launch and leave, air combat missile which uses passive infrared (IR) energy for acquisition and tracking and compliments the Advanced Medium Range Air-to-Air Missile. The AIM-9X addresses the requirement for evolutionary improvements to the AIM-9

Evolutionary improvements in missile seeker, fuze/warhead, and kinematics allow retrofit of components to current missiles to the maximum extent possible. This will extend the operational effectiveness of existing inventories at an affordable cost while continuing the evolution of the AIM-9 series.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program: (FY 1993 funded in OSD PE 0603715D)
   - (U) Completed IOT&E of AIM-9M-8/9 modification and awarded contract for kit production and installation.
   - (U) Initiated pipeline for AIM-9M-8/9 retrofit program.
   - (U) Finalized AIM-9X Joint Operational Requirements Document (JORD)
   - (U) Completed Concept Definition to include a Cost and Operational Effectiveness Analysis (COEA), systems engineering studies, and operational analyses to define optimum systems characteristics
   - (U) Initiated preparation for AIM-9X Demonstration and Validation (DEMVAL)

2. (U) FY 1994 Planned Program: (FY 1994 funded in OSD PE 0603715D)
   - (U) A Milestone VI/I Defense Acquisition Board approval to enter AIM-9X DEMVAL was planned for April 1994. However, OSD has placed the DEMVAL Request for Proposal (RFP) and program on hold to examine a potential international cooperative agreement to satisfy the AIM-9X requirement.
   - (U) Award competitive DEMVAL contract to at least two qualified vendors (ECD: 4th Qtr FY94).

Program Element: 0207161F
PE Title: Tactical Air Intercept Missile (AIM)
Project Number: 4132
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

3. (U) FY 1995 Planned Program:
   - (U) ($18.1M) Continue Demonstration and Validation (DEMVAL) for missile seeker prototype and other elements to support Engineering and Manufacturing Development (EMD) (ECD: 2nd Qtr FY96).
   - (U) ($8.8M) Engineering support to China Lake and other agencies for DT&E/OT&E program to include test range costs and instrumentation (ECD: Continuing).
   - (U) (Not Separately Priced (NSP)) Prepare Request for Proposal for AIM-9X EMD.
   - (U) (NSP) Begin preparation and analysis for Milestone II decision to enter Phase II, EMD.

4. (U) Program to Completion:
   - (U) Continued sustaining engineering support in-house.
   - (U) Initiate Low-Rate Initial Production (LRIP) and subsequent Full-Rate production of the AIM-9X.
   - (U) OT-IIB OPEVAL (23 launches)

D. (U) WORK PERFORMED BY: The Short Range Missile Joint Program Office (PMA-259), NAVAIR, manages all AIM-9 development activities under the provisions of the US Air Force/US Navy Memorandum of Agreement, which established the Navy as lead Service. Concept definition studies are being conducted in-house by the Naval Weapons Center, China Lake CA with Air Force participation. Pending OSD decision, AIM-9X seeker DEMVAL, Engineering and Manufacturing Development, and production will be accomplished by defense contractors under management of the Joint Program Office. Funding for the AIM-9X RDT&E effort is shared 50-50 with the Navy.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: The Milestone IV/I decision delayed from April 1994 to August 1994 to evaluate a potential international cooperative agreement to satisfy the AIM-9X requirement.

3. (U) COST CHANGES: TBD

Program Element: 0207161F
PE Title: Tactical Air Intercept Missile (AIM)
Project Number: 4132
Date: February 1994
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

F. PROGRAM DOCUMENTATION:

- ORD 9/93
- COEA 9/93
- STAR 8/93

G. RELATED ACTIVITIES:

- (U) The AIM-9X is a joint Air Force and Navy program with the Navy as executive service. Management relationships and responsibilities are included in a Joint Memorandum of Agreement. The Joint Tactical Air-to-Air Missile Oversight Committee and Steering Group provide executive level monitoring of short range missile activities. There is no unnecessary duplication of effort within the Air Force or the Department of Defense.
- (U) Program Element #0604354N, Air-to-Air Missile Systems Engineering (Navy RDT&E)
- (U) Program Element #0603715D, AIM-9 Consolidated Program (Defense Agencies Account) monitoring of SRM activities. There is no unnecessary duplication of effort within the Air Force or the Department of Defense.
- (U) Joint Potential Designator: Joint

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: Missile Procurement (3020), Budget Activity: 3, Program Title: AIM-9M-8/9 Modification								
11,681	4,716	8,304	16,080	13,811	0	0	0	55,463
(575)	* (1796)	(1175)	(2495)	(1392)				7,433

* In FY 94, 1083 modification kits will be procured and installed with FY 93 funds.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Currently being investigated.

Program Element: 0207161F
PE Title: Tactical Air Intercept Missile (AIM)
Project Number: 4132
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

J. (U) TEST AND EVALUATION DATA: The AIM-9X Test and Evaluation Master Plan will be written during FY94 to support developmental tests (DT) that are planned to start in FY95.

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
AIM-9M-8/9 IOT&E	June 93	Complete

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
Begin AIM-9X DT-I	Sep 94	
Begin AIM-9X DT-IIA	Apr 96	
Begin AIM-9X DT-IIB	Nov 97	

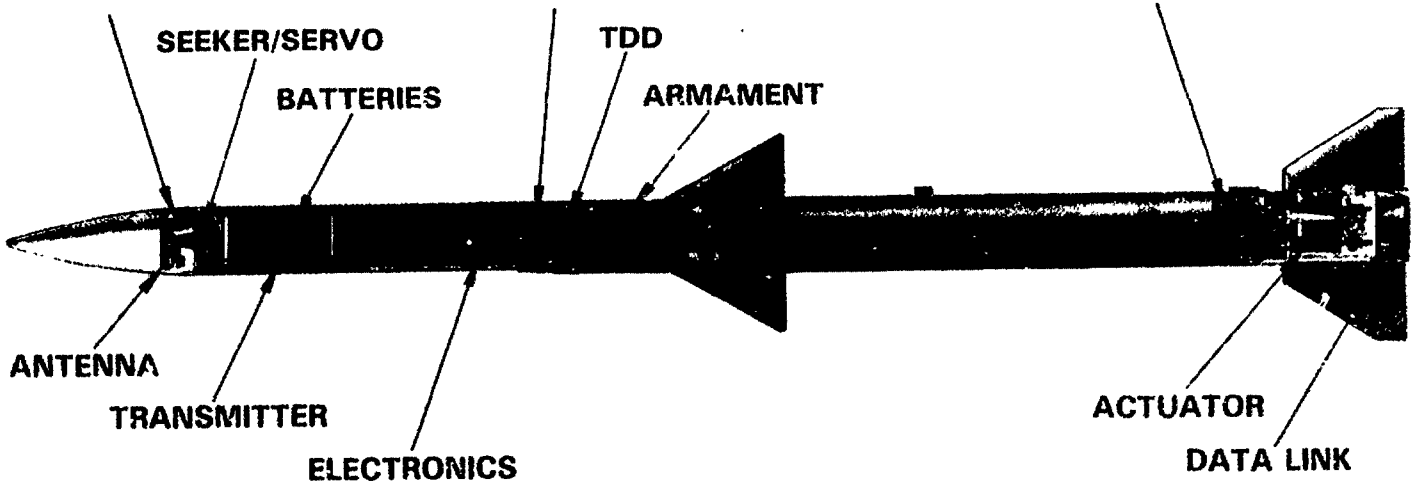
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207163F
PE Title: Advanced Medium Range Air-to-Air Missile

Project Number: 3777
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: AMRAAM Pre-Planned Product Improvement (P3I)



Program Element: 0207163F
PE Title: Advanced Medium Range Air-to-Air Missile

Project Number: 3777 Date: February 1994
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
POPULAR NAME: Advanced Medium Range Air-to-Air Missile

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones					Milestone IV FY97			
Engineering Milestones	P3I-1 CDR Jan/FY93	P3I-1 FCA/PRR May/FY94	P3I-2 PDR Sep/FY95	P3I-2 CDR Feb/FY96		P3I-2 FCA/ PRR 1Q/FY98	P3I-3 PDR 2Q/FY99	TBD
T&E Milestones		P3I-1 FLT TEST		P3I-2 FLT TEST	P3I-2 FLT TEST	P3I-2 FLT TEST		TBD
Contract Milestones		P3I-2 Award Mar/FY94	P3I-2 DEMO Awards Dec/FY94			P3I-3 Award 2Q/FY98		
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**F 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	32156	54084	55585	36984	37143	17078	38700	Continuing
Support Contract	1770	1690	2130	1060	1090	1120	1200	Continuing
In-House Contract	4730	10630	12030	14870	13440	9710	3700	Continuing
GFE/Other	200	700	970	1370				Continuing
Total	38856	67104	70715	54284	51673	27908	43600	Continuing

Program Element: 0207163F
PE Title: Advanced Medium Range Air-to-Air Missile
Project Number: 3777
Date: February 1994
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Air Force and Navy developed the baseline AMRAAM as a high performance, all weather missile to counter existing air vehicle threats operating at high or low altitude and having advanced electronic countermeasures capabilities. The AMRAAM P3I program provides for a continuing, Joint Air Force/Navy research and development program which enables AMRAAM to be compatible with advanced fighters, enhances the missile's capability and operational flexibility against mid-1990's and beyond threats, incorporates high payoff technology developments, and investigates new variants and/or alternate missions that can utilize many baseline missile attributes. This is a Research Category 6.7 effort which develops improvements to the operational AMRAAM to increase its capability against evolving threats.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Continued development of improvements begun in FY 1991, including completion of the Critical Design Review for Phase 1, Jan 93, providing proof-of-design/manufacturing hardware for subsystem and system level testing. Conducted the compressed carriage Separation/Control Test vehicle test and completed COEA Part 1 on technical and need assessment in support of P3I Phase 3 (ECD: FY95). (USAF $38.9M)
   - (U) - Continued participation in AMRAAM P3I Phase 1 with emphasis on Navy unique requirements and aircraft integration compatibility and in P3I Phase 2/3 program planning and implementation (ECD: FY95). (Funded by USN)

2. (U) FY 1994 Planned Program:
   - (U) - Continue the development of P3I Phase 1 improvements begun in FY 1991 and initiate P3I Phase 1 free flight tests against targets (ECD: 2Q/FY95). (USAF $44.2M)
   - (U) - Continued participation in AMRAAM P3I Phase 1 program including Functional Configuration Audit/Production Readiness Review with emphasis on Navy unique requirements and aircraft integration compatibility (ECD: FY95) (Funded by USN with FY93 funds)
   - (U) - Award the P3I Phase 2 contract which includes enhanced ECCM, improved lethality/weapon effectiveness, and update the COEA Operational Assessment in support of P3I Phase 3 (ECD: 4Q/FY94). (USAF $22.9M)

Program Element: 0207163F
PE Title: Advanced Medium Range Air-to-Air Missile
Project Number: 3777
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

3. (U) FY 1995 Planned Program:
   - (U) - Complete development of improvements begun in FY 1991 and Phase 1 flight test against targets (2Q/FY95). (USAF $9.8M)
   - (U) - Continued participation in AMRAAM P3I Phase 1 program with emphasis on Navy unique requirements and aircraft integration compatibility (ECD: 2Q/FY95) (Funded by USN)
   - (U) - Continue Phase 2 EMD for ECCM and weapons effectiveness improvements, and initiate seeker/propulsion technology and integration demonstrations, based on the COEA (ECD: 2Q/FY98) (USAF $60.9M and funded by USN)

4. (U) Program to Completion:
   - (U) - Initiate Joint AF/Navy P3I Phase 3 EMD in FY 1998 for improved ECCM, seeker, kinematics, and weapon effectiveness improvements.
   - (U) - Complete Phase 2 development in FY 1998 with production incorporation in FY 1999.
   - (U) - Complete Phase 2 demonstrations (which support Phase 3) in FY 1998.
   - (U) - This is a continuing program.

D. (U) WORK PERFORMED BY: This program is managed by the AMRAAM Joint System Program Office at the Aeronautical Systems Center, Eglin AFB FL. Production contracts have been awarded to Hughes Aircraft Company, Tucson AZ; and Raytheon Company, Bedford MA. A cost plus contract was awarded to Hughes (with Raytheon as a major subcontractor) to perform the AMRAAM P3I development effort. Production competition is planned.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: COEA support was incorporated into FY94-FY95.
2. (U) SCHEDULE CHANGES: Based on Navy funding (FY94 zeroed), demonstration efforts were delayed to FY95 also delaying P3I Phase 3 EMD start.

Program Element: 0207163F
PE Title: Advanced Medium Range Air-to-Air Missile
Project Number: 3777
Date: February 1994
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

3. (U) COST CHANGES: Fiscal year 1993 was increased within AF reprogramming authority to $38.9M to support weapon effectiveness and ECCM studies, wing/fin interchangability design support, and Phase I contract funding increment. Fiscal year 1994 was decreased $2M by Congress, deleteing AMRAAM support for the Multispectral Air-to-Air Seeker. Fiscal years 1995 and out had a slight increase for inflation.

F. (U) PROGRAM DOCUMENTATION:

- MENS	Nov 78	TEMP	Apr 92
- SOC	Jul 86	DCP	Mar 91
- SORD	Jan 90	JSOR (USAF ROC 9-76)	May 91
- ILSP	Feb 91	STAR	Apr 92

G. (U) RELATED ACTIVITIES:

(U) - AMRAAM integration with the following programs: Program Element #0207130F (F-15), Program Element #0207134F (F-15E), Program Element #0207133F (F-16), Program Element #0604239F (F-22), Program Element #0205667N (F-14 Upgrade), Program Element #0204136N (F/A-18 Squadrons), Program Element #0207163N (AMRAAM Navy P3I), Program Elements #0204162N and #0206138M (Navy Proc).

(U) - AMRAAM integration with and support to technology program tasks planned for incorporation in P3I Phases 2 and 3: Program Element #0603601F, Programmable Ordnance Technology task; Program Element #0603216F, Variable Flow Ducted Rocket task.

(U) - Joint Potential Designator: Joint.

(U) - The AMRAAM program is a joint Air Force and Navy program with the Air Force as the executive service. Management relationships and responsibilities are included in a Joint USAF/USN Program Management Charter. There is no unnecessary duplication of effort within the Air Force or Department of Defense.

Program Element: 0207163F
PE Title: Advanced Medium Range Air-to-Air Missile
Project Number: 3777
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

	FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: Missile Procurement (3020), Budget Activity: #2, Program Title: AMRAAM									
BP 20	605,834	473,387	308,352	305,709	253,804	297,770	241,030	1,651,900	8,330,100
BP 25	2,203	20,429	22,435	21,557	22,991	22,655	22,838	140,300	286,700
BP 26	6,881	5,587	8,641	7,897	7,370	5,692	2,951	17,200	95,300
Total	614,918	499,403	339,428	335,163	284,165	326,117	266,819	1,809,400	8,712,100
Qty	1000	983	412	460	338	373	282	2218	9623
Appropriation: Missile Procurement (3020), Budget Activity: #2, Program Title: SEEK EAGLE									
BP 20	0	13,788	1,110	0	0	0	0	0	19,565
Qty	0	24	1	0	0	0	0	0	37
Appropriation: Operation and Maintenance (3400), Budget Activity: #2, Program Title: AMRAAM									
$	0	22	27	23	25	26	27	Cont	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System
Budget Activity : #7 Operational Systems Development
Old Budget Activity : #4 Tactical Programs

Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual[1]	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3201 Tactical Air Reconnaissance System (TARS)								
14,300	000	000	000	000	000	000	0	
3652 Joint Service Imagery Processing System (JSIPS)								
6,638	8,582	000[2]	000	000	000	000	0	
3792 F-16R								
37,424	000	000	000	000	000	000	0	
Total								
58,362	8,582	000	000	000	000	000	0	

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Follow-On Tactical Reconnaissance System (FOTRS) was an umbrella tactical reconnaissance improvement effort. The program's objective was to meet our tactical commanders' requirement for timely imagery intelligence information. FOTRS was designed to replace the current film-based imaging and wet-film processing systems with a digital imaging and processing system capable of providing real-time/near-real-time tactical reconnaissance information. FOTRS

[1] (U) Alternative allocation of funding excess to requirements is under evaluation.
[2] (U) Funds for JSIPS FY95 and beyond transferred to PE 0305154D, Defense Airborne Reconnaissance Program, managed by the DUSD/AT Defense Airborne Reconnaissance Office (DARO).

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System
Budget Activity : #7 Operational Systems Development
Old Budget Activity : #4 Tactical Programs

Date: February 1994

development consisted of an airborne portion called the Advanced Tactical Air Reconnaissance System (ATARS) and a ground portion called the Joint Services Imagery Processing System (JSIPS). The USAF portion of ATARS consisted of two development projects: Project 3201, Tactical Air Reconnaissance System (TARS), and Project 3792, a reconnaissance capable F-16C named the F-16R. TARS focused on the full scale development of digital electro-optical and infrared sensors, datalink, recorders, and management system. A single TARS sensor, either day or night sensor, would be the payload on the USAF, USN, and USMC Medium Range Unmanned Aerial Vehicle (MR-UAV). The USMC F/A-18D(RC) would carry TARS sensors on a pallet which is interchangeable with the gun pallet. The F-16R project would have developed a tactical reconnaissance pod and modify existing F-16s to provide "hands-on, head-up" cockpit reconnaissance controls. The USAF was to integrate TARS into the reconnaissance pod for carriage on the F-16R. The USAF and the ATARS prime contractor agreed to a mutual cessation of the ATARS contract in FY93. This decision resulted in the cancellation of the F-16R program and contributed to the decision to terminate the MR-UAV program, since the planned payloads were no longer available. The USAF transferred all remaining EMD hardware to the Navy/Marine Corps, who will continue to develop a sensor package for the F/A-18D(RC). JSIPS is Project 3364 under FOTRS. JSIPS, a joint-Service effort, focuses on the development of a ground station capable of receiving, processing, exploiting, and disseminating multi-sensor national, theater, and tactical imagery (EO/IR/radar) from Air Force, Navy, and Marine Corps manned and unmanned systems. JSIPS funding, FY95 and beyond, is in PE 0305154D, Defense Airborne Reconnaissance Program, DUSD/AT Defense Airborne Reconnaissance Office (DARO).

FY 1995 RDT&E DESCRIPTIVE SUMMARY

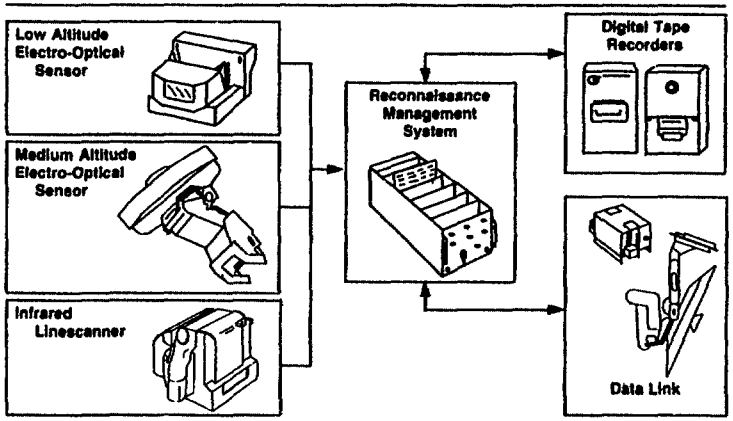
Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3201
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: Tactical Air Reconnaissance

ADVANCED TACTICAL AIR RECONNAISSANCE SYSTEMS (ATARS)



Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3201
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

Date: February 1994

POPULAR NAME: TARS

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Engineering Milestones	RF-4 H/W Deliveries (Jan)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
T&E Milestones	RF-4C DT&E/OA (Feb) F/A-18D(RC) CFT (Jun)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Contract Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

BUDGET ($000)	FY 1993	FY 1994	FY 1995	FY 1996	F Y1997	FY 1998	FY 1999	Budget Total (To Complete)
Major Contract	000	000	000	000	000	000	000	N/A
Support Contract	980	000	000	000	000	000	000	N/A
In-House Contract	403	000	000	000	000	000	000	N/A
GFE/Other	8,052	000	000	000	000	000	000	N/A
Total	9,433	000	000	000	000	000	000	N/A

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3201
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Tactical Air Reconnaissance System (TARS) was an engineering and manufacturing development (EMD) project to meet the needs of tactical commanders for responsive and timely location and classification of tactical targets. This project focused on the development of a common sensor suite consisting of Electro-Optical (EO) and Infrared (IR) sensors, data link, recorders and reconnaissance management system for carriage on USAF, USMC, and USN manned and unmanned tactical reconnaissance systems. The Air Force was to integrate the sensor suite into a reconnaissance pod for the F-16R. Also, either a day or night TARS sensor, with supporting subsystems, was to be the reconnaissance payload for the Medium Range Unmanned Aerial Vehicle (MR UAV). The Air Force designation for the MR UAV with the TARS payload was the Unmanned Air Reconnaissance System (UARS). The RF-4C served as a sensor validation test bed in support of F/A-18D(RC), F-16R, and UAV-MR integration testing.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Finished contractor flight testing on RF-4C. ($8.448M)
     - (U) -- Accepted two TARS and two UARS sensor suites for government flight test. (NSP)[1]
     - (U) -- Began TARS Development Test & Evaluation (DT&E) on RF-4C. (NSP)
     - (U) -- Continued environment qualification testing. (NSP)
     - (U) -- Continued first lifetime durability testing. (NSP)
   - (U) - Contract with prime contractor terminated in Jun 93. (NSP)
   - (U) - Other program support ($1.298M)

2. (U) FY 1994 Planned Program[2]:
   - (U) - Finish program closeout activities. ($0.290M)
   - (U) - De-modify RF-4C aircraft used for contractor flight testing. ($0.620M)

3. (U) FY 1995 Planned Program: N/A

[1] (U) NSP: Not Separately Priced.
[2] (U) Close-out activities paid with FY93 funds

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3201
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

Date: February 1994

4. (U) Program to Completion: N/A

D. (U) WORK PERFORMED BY: The prime contractor for the Tactical Air Reconnaissance System (TARS) development was Martin Marietta Electronics, Information, and Missiles Group of Orlando FL. The contract with Martin Marietta was terminated by mutual agreement between the government and the contractor in June 1993. The Aeronautical Systems Center, Wright-Patterson AFB OH, has in-house management responsibility for system development. Subcontractors supporting the TARS project were as follows:

E-Systems	Greenville, TX	RF-4C Group A
Loral Fairchild Systems	Syosset, NY	EO Sensors
LIRIS	Lexington, MA	IR Line Scanner
Datatape	Pasadena, CA	Digital Tape Unit
Paramax	Salt Lake City, UT	Data Link
Computing Devices	Hastings, UK	Management System

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Cancellation of program.
2. (U) SCHEDULE CHANGES: Cancellation of program.
3. (U) COST CHANGES: Cancellation of program.

EXPLANATION:

F. (U) PROGRAM DOCUMENTATION:

- (U) TAF SON, 7 Aug 79
- (U) MENS, May 81

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3201 **Date:** February 1994
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

- (U) JMENS, Mar 82
- (U) SDDM, 30 Mar 87
- (U) TAF SON, 18 Dec 87
- (U) PDM, 14 Jul 88
- (U) TEMP, 10 May 89
- (U) TAF SORD, 13 Jul 92

G. RELATED ACTIVITIES:

- (U) PE 0305141D, DOD Joint Unmanned Air Vehicle Program.
- (U) PE 0207133F, F-16.
- (U) PE 0204136N, F/A-18.
- (U) PE 0207213F, EO Long Range Oblique Photography (EO LOROP).
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Not Applicable

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None. However, a number of NATO and non-NATO countries interested in TARS have requested Price and Availability data.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
RF-4C Contractor Flight Test	Aug 92	Medium Altitude Electro-Optic (MAEO) sensor; Lens focus and inadequate stabilization during roll test

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3201 **Date:** February 1994
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

RF-4C Contractor Flight Test	Aug 92	Low Altitude Electro-Optic (LAEO), MAEO, Infra-Red Line Scanner (IRLS) sensors, two recorders, datalink environmental test
RF-4C Contractor Flight Test	Aug 92	MAEO Functional Evaluation; Focus/Stability
RF-4C Contractor Flight Test	Sep 92	Environmental Test w/Full Suite
RF-4C Contractor Flight Test	Sep 92	Environmental Test w/Full Suite 2nd Test
RF-4C Contractor Flight Test	Oct 92	Demonstrate Real-time Data link w/JSIPS; Header information
RF-4C Contractor Flight Test	Nov 92	MAEO Stabilization Data (Active)
RF-4C Contractor Flight Test	Nov 92	MAEO Stabilization Data (Inert)
RF-4C Contractor Flight Test	Dec 92	Data Link Test
RF-4C Contractor Flight Test	Dec 92	MAEO Stabilization Data
DD 250	Jan 93	Govt Acceptance of First Suite
DD 250	Feb 93	Govt Acceptance of Second Suite
RF-4C DT&E/OA Start	Feb 93	RF-4C Government Flight Test

T&E ACTIVITY (TO COMPLETION): N/A

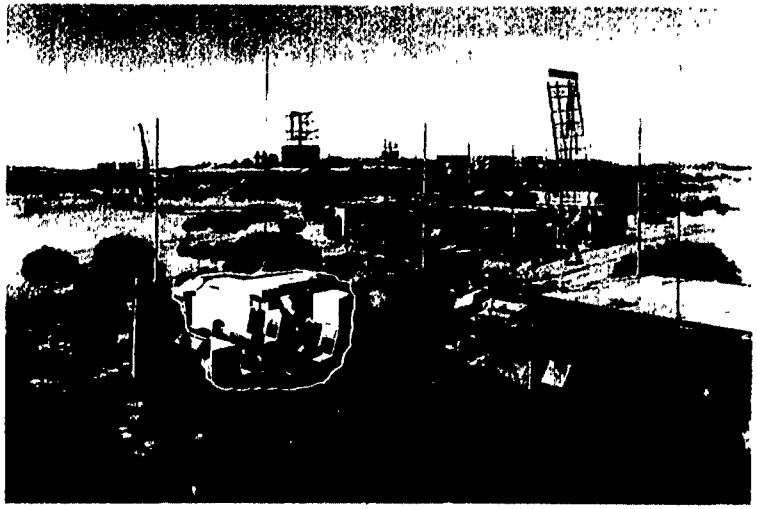
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3652
Budget Activity : #7 Operational Systems Development
Old Budget Activity: -#4 - Tactical Program

Date: February 1994

Project Title: Joint Service Imagery Processing System



Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3652
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

Date: February 1994

POPULAR NAME: JSIPS

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	National JSIPS Contract Award				MS III (FY 2/97)			Complete Production
Engineering Milestones	Functional Config Qual - SES, CSS, and SSS[1]	OT&E Operator Training						
T&E Milestones	Tactical JSIPS DT&E (Feb)	Multi-Service OT&E (3/94)		Multi-Service OT&E (2/96)				JSIPS Support for Service Platforms
Contract Milestones	LRIP Contract Award		N/A					Continue Production Through FY02

BUDGET ($000)	FY 1993	FY 1994	FY 1995	FY 1996	F 1997	FY 1998	FY 1999	Budget Total (To Complete)
Major Contract	000	5,000	000	000	000	000	000	65,900
Support Contract	5,038	1,982	000	000	000	000	000	46,112
In-House Contract	700	700	000	000	000	000	000	28,412
GFE/Other	900	900	000	000	000	000	000	12,214
Total	6,638	8,582	000	000	000	000	000	152,638

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Joint Service Imagery Processing System (JSIPS) provides a common transportable system capable of receiving, processing, exploiting, and disseminating

[1] (U) SES: Softcopy Exploitation System; CSS: Communications Support Segment; SSS: Software Support Segment.

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System
Project Number: #3652
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program
Date: February 1994

digital imagery in softcopy or hardcopy. JSIPS will replace the costly and manpower/logistics intensive Photo Processing and Interpretation Facilities (PPIFs) associated with the RF-4C. JSIPS can be configured in one of three ways: National, Tactical, or National and Tactical. The USAF JSIPS will be configured with a National input segment and will meet the commander's need for timely and responsive National imagery for the detection, location and classification of targets. In addition to National inputs, the USAF JSIPS was also designed to support USAF, USN, and USMC manned and unmanned reconnaissance vehicles carrying the Tactical Air Reconnaissance System (TARS) sensor suite. Funds for JSIPS from FY95 and beyond are in PE 0305154D, managed by DUSD/AT/DARO.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Conducted system functional qualification testing on the SES, CSS, and SSS. (NSP)[2]
   - (U) - Shipped National Input Segment (NIS) to Eglin AFB, FL. (NSP)
   - (U) - Conducted reliability test on the dual-capable JSIPS - National and Tactical capability. (NSP)
   - (U) - Supported Developmental Test & Evaluation (DT&E) in conjunction with the TARS-equipped RF-4C. (NSP)
   - (U) - Completed System Acceptance Test on National JSIPS. ($6.6M)

2. (U) FY 1994 Planned Program:
   - (U) - Rapid Positioning Capability. ($5.0M)
   - (U) - On the dual-capable JSIPS, conduct: maintainability demonstration; TEMPEST testing; continue government DT&E; system accreditation of the National JSIPS; FCA/PCA, and DD 250. ($3.58M)
   - (U) - Conduct Operational Test & Evaluation (OT&E) operator training. (NSP)
   - (U) - Conduct dual-system JSIPS Functional Qualification Test. (NSP)
   - (U) - Move system from Eglin AFB, FL, to Camp Pendleton, CA. (NSP)

[2] (U) NSP: Not Separately Priced.

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System
Project Number: #3652
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program
Date: February 1994

3. (U) FY 1995 Planned Program[3]: Not Applicable (see footnote 5)

4. (U) Program to Completion: Not Applicable (see footnote 5)

D. (U) WORK PERFORMED BY: The contractor for full-scale development of the Joint Service Imagery Processing System (JSIPS) is E-Systems, Garland TX. Electronic Systems Center, Hanscom AFB MA, has responsibility for in-house management. Subcontractors supporting the JSIPS project are as follows:

Brunswick	Marion, VA	Shelters
CALSPAN	Alexandria, VA	Computer-Aided Tactical Information System (CATIS) Augmentation
Autometric	Alexandria, VA	Hard Copy Exploitation
Datatape	Pasadena, CA	Digital Tape Unit
Paramax	Salt Lake City, UT	Data Link
CONTEL	Westlake Village, CA	Intelligence Work Station (IWS) Software Testing/CATIS Integration

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The USAF has cancelled further development of the Mission Verification Systems (MVSs) and the Tactical Input Segment (TIS) of JSIPS.

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[3] (U) Funds moved to PE 0305154D, Defense Airborne Reconnaissance Program, managed by DUSD/AT/DARO.

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System
Project Number: #3652
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program
Date: February 1994

2. (U) SCHEDULE CHANGES: The delay and subesequent termination of the Tactical Air Reconnaissance System (TARS) sensor suite hardware deliveries and completion of ICD compliant ATARS tape for testing have delayed the completion of the JSIPS B/C model Test Schedule. The Tactical Input Segment testing schedule and production decision has been realigned as noted in Section C., Program Accomplishments and Plans.

3. (U) COST CHANGES: The increase in the JSIPS funding in FY94 and beyond is attributable to the schedule changes. A program increase will provide for additional geo-positioning and targeting data.

F. (U) PROGRAM DOCUMENTATION: List all program documentation and date, e.g.

- (U) SOC, Jan 87
- (U) SON, USAF 002-85, Feb 88
- (U) TEMP, Dec 89*
- (U) JSORD, Dec 90*

(U) * These documents are being updated.

G. (U) RELATED ACTIVITIES:

- (U) MOAs with USN, USA and USMC. PE 060373A and PE 0604718M.
- (U) PE 0305154D, Defense Airborne Reconnaissance Program.
- (U) PE 0207435F, MVS and National/Tactical JSIPS procurement.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System
Project Number: #3652
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program
Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

Procurement (3080):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
PE 0305154D, 3600 (RDT&E), Defense Airborne Reconnaissance Program								
000	000	11,199	4,742	3,576	3,252	000	0	
PE 0305154D, 3080 (Procurement), Defense Airborne Reconnaissance Program								
000	000	12,700	40,000	27,100	40,900	1,500	5,000	
PE 0207435F, 3080 (Procurement), Tactical Reconnaissance Imagery Exploitation								
15,751	000	000[4]	000	000	000	000	000	

*Note: JSIPS quantities reflect national (.5) and tactical segment (.5) procurement to achieve two dual-capable systems.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Communications Support Segment (CSS) Functional Qualification Test (FQT) (D2)	Nov 91	Successful
Operational Assessment	Jan 92	Partially Successful (Reassessment Scheduled, TBD)
System Support Segment (SSS) FQT (D)	Feb 92	Successful

[4] (U) Funds FY95 and beyond transferred to PE 0305154D, Defense Airborne Reconnaissance Program.

Program Element: 0207217F
PE Title: Follow-on Tactical Reconnaissance System

Project Number: #3652
Budget Activity : #7 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

Date: February 1994

SSS FQT (B/C)	Apr 92	Successful
CSS FQT (B/C)	Apr 92	Successful
Operational Assessment	Jun 92	Successful
Deployed System (Eglin AFB, FL)	Jul 92	Successful
System FQT (D2)	Jul 92	Successful
Government DT&E (D)	Aug 92	Successful
System D Final Accreditation	Feb 93	Successful
Softcopy Exploitation Segment (SES) FQT (B/C)[5]	Apr 93	Partially Successful
Tactical Input Segment (TIS) FQT (B/C)[6]	Jul 93	Partially Successful
System FQT (B/C)[7]	Sep 93	Partially Successful

T&E ACTIVITY (TO COMPLETION):

Multi-Service Operational Test & Evaluation (MOT&E) (B/C)	May 94

[5] (U) Termination of the ATARS contract precluded accomplishment of all test objectives.
[6] (U) Termination of the ATARS contract precluded accomplishment of all test objectives.
[7] (U) Termination of the ATARS contract precluded accomplishment of all test objectives.

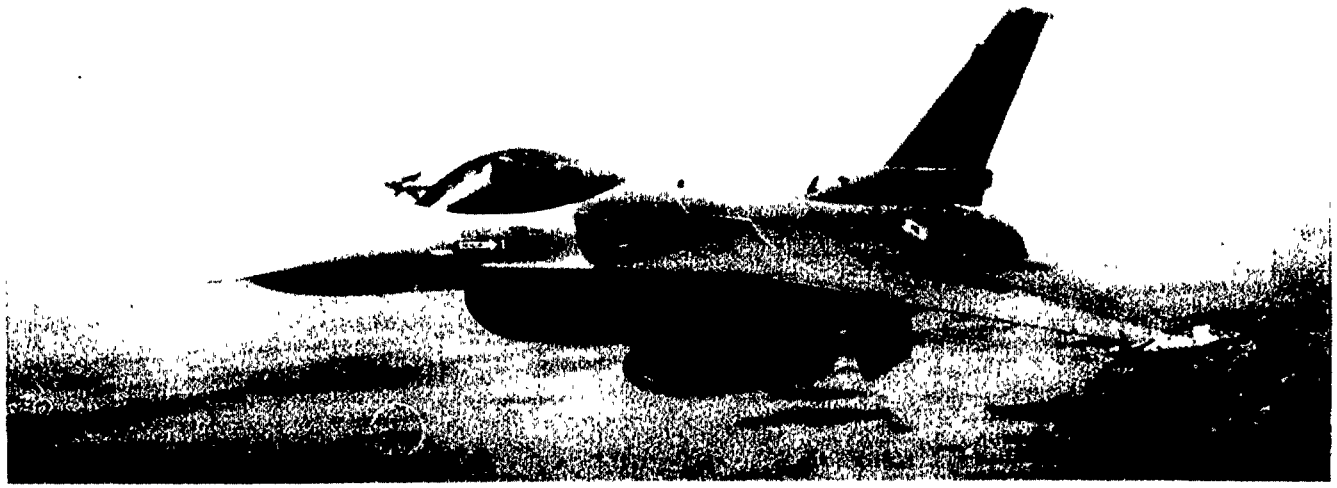
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207217F
PE Title: Follow-on Tactical ReconnaissanceSystem

Project Number: #3792
Budget Activity : #7 Operational Systems Development
Old Budget Activity : #4 Tactical Programs

Date: February 1994

Project Title: F-16R



Program Element: #0207217F
PE Title: Follow-on Tactical ReconnaissanceSystem

Project Number: #3792
Budget Activity : #5 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

Date: February 1994

POPULAR NAME: F-16R

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Engineering Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
T&E Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Contract Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**F Y1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	1,400	000	000	000	000	000	000	N/A
Support Contract	000	000	000	000	000	000	000	N/A
In-House Contract	000	000	000	000	000	000	000	N/A
GFE/Other	2,591	000	000	000	000	000	000	N/A
Total	3,991	000	000	000	000	000	000	N/A

Program Element: #0207217F
PE Title: Follow-on Tactical ReconnaissanceSystem
Project Number: #3792
Budget Activity : #5 Operational Systems Development
Old Budget Activity: #4 - Tactical Program
Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The F-16R project focused on modifying existing F-16 aircraft to provide a day/night reconnaissance capability through a fully integrated tactical reconnaissance pod containing the Tactical Air Reconnaissance System (TARS). The F-16R would have used existing hardware to provide the pilot with a "hands-on, head-up" capability. The TARS-equipped F-16R would have been compatible with the Joint Service Imagery Processing System. This project built on planning and demonstrations previously conducted for the Follow-On Tactical Reconnaissance System in the 1986 F-16 reconnaissance demonstration/validation. The project is cancelled.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Awarded Time and Materials contract ($1.400M)
     - (U) -- Continued cockpit missionization simulation to determine pilot/vehicle interface (displays and controls). (NSP)[1]
     - (U) -- Defined software design requirements. (NSP)
     - (U) -- Defined partition of software tasks between F-16 avionics. (NSP)
     - (U) -- Began design of modification kit. (NSP)
     - (U) -- Began pod design vibration, structural, and aerodynamic analysis. (NSP)
     - (U) -- Completed preliminary pod drawings. (NSP)
     - (U) -- Continued to develop the Interface Control Document (ICD) through monthly technical interchange and interface control working groups. (NSP)
     - (U) -- Began F-16R stability and control, aerodynamic, electromagnetic compatibility, and HAVE GLASS analyses. (NSP)
     - (U) -- Began definition of maintenance and aircrew training requirements. (NSP)
     - (U) -- Began logistics support analysis. (NSP)
     - (U) -- Began preliminary flight test instrumentation drawings. (NSP)
     - (U) -- Began to prepare test plans. (NSP)
     - (U) -- Began development of the manufacturing plan. (NSP)
   - (U) - Supported Navy sensor integration (development and testing) on the F/A-18. ($2.539M)

[1] (U) NSP: Not Separately Priced.

Program Element: #0207217F
PE Title: Follow-on Tactical ReconnaissanceSystem
Project Number: #3792
Budget Activity : #5 Operational Systems Development
Old Budget Activity: #4 - Tactical Program
Date: February 1994

(U) - Contract with prime TARS contractor terminated and program cancelled. (NSP)
(U) - Stopped work on F-16R pre-EMD Time and Material contract with Lockheed Corp., and closed out activities ($0.0170M)
(U) - Other program support. ($0.035M)

2. (U) FY 1994 Planned Program:
(U) - None.

3. (U) FY 1995 Planned Program:
(U) - None.

4. (U) Program to Completion:
(U) - Not Applicable.

D. (U) WORK PERFORMED BY: The prime contractors for the F-16R were Lockheed, Ft Worth TX, and Martin Marietta Electronics, Information, and Systems Group, Orlando FL. The Aeronautical Systems Center, Wright-Patterson AFB OH has in-house responsibility for system development.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Cancellation of program.

2. (U) SCHEDULE CHANGES: Cancellation of program.

3. (U) COST CHANGES: Cancellation of program.

F. (U) PROGRAM DOCUMENTATION:

Program Element: #0207217F
PE Title: Follow-on Tactical ReconnaissanceSystem
Project Number: #3792
Date: February 1994
Budget Activity : #5 Operational Systems Development
Old Budget Activity: #4 - Tactical Program

- (U) TAF SON, 8/79
- (U) MENS, 5/81
- (U) JMENS, 3/82
- (U) SDDM, 3/87
- (U) TAF SON, 4/88
- (U) PDM, 7/88
- (U) SORD, 5/91

G. (U) RELATED ACTIVITIES:
- (U) PE 0207133F, F-16.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207247F
PE Title: AF TENCAP
Project Number: 0001
Budget Activity: 7 -- Operational Systems Development
Old Budget Activity: #4-Tactical Programs
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
#0001: AF TENCAP (Tactical Exploitation of National Capabilities)								
4099	14640	21183	7092	7934	8715	10081	Cont	Cont

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: A Congressionally directed program to provide the Tactical Exploitation of National Capabilities (TENCAP). The objective of TENCAP is to improve warfighting capabilities and effectively leverage the billions invested in our national systems for the warfighter.

(U) Mission Requirement: TENCAP will focus in three areas:

1) Exploit existing national systems for the tactical warfighter [TENCAP will conceive, build, and demonstrate equipment and techniques, in the form of projects, to exploit national systems].
2) Educate warfighters about national systems capabilities [in the form of training, exercises, and readiness activities].
3) Influence the design and operation of new national systems for the warfighter by advocating tactical impacts of the new systems [in the form of analysis and integration of national systems into roadmaps and architectures for AF weapons/C4I systems].

(U) System Capabilities of TENCAP systems are classified. Contact AF/XORR for additional information.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program: $4,099 Total RDT&E Program
   (U) - Completed JCS Directed Special Project Eidolon Lance (SPEL) 93: $3,440
   -- Served as DoD Service-wide Executive Agent for SPEL-93

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207247F
PE Title: AF TENCAP
Project Number: 0001
Budget Activity: 7 -- Operational Systems Development
Old Budget Activity: #4-Tactical Programs
Date: February 1994

-- Participated as active Air Force Service TENCAP component in SP-93
-- SPEL-93 completed; next Special Project scheduled for FY95

(U) - Initiated analysis of future national systems: $659

2. (U) FY 1994 Planned Program: $14,640 Total RDT&E Program

(U) - Exploit the tactical use of existing national systems for the warfighter: $12,300

-- Talon Command: $2,500
--- Event: Establish initial operational capability (IOC) for project Shield (Apr 94).
--- Event: Complete development and field modified PRC-112 Search and Rescue radio with an embedded GPS chip to support Combat Survivor Evader Locator (CSEL) requirements (Sep 94).

-- Talon Ready: $1,200
--- Event: Develop capability to receive, process and merge multi-spectral broad area imagery with different types of high resolution national imagery both in a centralized facility, and in deployed combat automated systems (C2, Intel, and mission planning) (Aug 94).
--- Event: Develop and field capability to exploit and process high resolution imagery for employment planning of precision guided weapons/sensors (Apr 94).

-- Talon Shooter: $2,000
--- Event: Explore and develop demonstrations of national systems capabilities to improve tactical weapon systems and platforms; in support of theater missile defense program activities, joint service and combined operations (Aug 94).

-- Talon Night: $2,000
--- Event: Develop and demonstrate advanced technology applications of national systems to multi-command special forces units (Sep 94).

-- Talon Touch: $3,000
--- Event: Develop and demonstrate potential dedicated combat information dissemination capabilities using existing national capabilities (SLDCOM, SATCOM, DISNET, etc.) to support all Talon Programs (Aug 94).
-- Talon Vision: $1,600
--- Event: Develop and demonstrate national capabilities, through TENCAP equipment systems and techniques, to warfighters at Flag series exercises (Nellis AFB, NV) (Jan 94); and other demonstration exercises directed by HQ USAF (Sep 94).

(U) - Training, education, exercises and readiness of national systems: $1,300
-- Exercise Support activities: $900
--- 6 PACAF, 3 USAFE, 3 CENTAF, 2AFLANT, 2 SOCOM, 1 SOUTHAF, Red/Blue/Green Flag
-- Readiness/Contingency Activities: $400

(U) - Influence and impact new national systems: $1,040
-- Identify requirements, develop plans, and integrate TENCAP technology into C4I/Weapons Systems: $540
-- Integrate Into Roadmaps and Architectures: $100
-- Analyze national system design against Air Force requirements: $200
-- Define Air Force systems interface to national systems (baseline knowledge): $200

3. (U) FY 1995 Planned Program: $21,183 Total RDT&E Program

(U) - Exploit the tactical use of existing national systems for the warfighter: $14,600
-- Talon Command: $2,900
--- Event: Exploit national systems to provide interim theater ballistic missile defense warning capability until an advanced space based early warning system is acquired (Apr 95).
--- Event: Explore and demonstrate interim capability to CSEL Program (Aug 95).

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207247F **Project Number:** 0001 **Date:** February 1994
PE Title: AF TENCAP **Budget Activity:** 7 -- Operational Systems Development
Old Budget Activity: #4-Tactical Programs

-- Talon Ready: $1,500
--- Event: Develop centralized processing capability to build, maintain and disseminate worldwide broad-area multi-spectral imagery to tactical warfighting forces and systems (Aug 95).
-- Talon Shooter: $2,400
--- Event: Develop and demonstrate advanced technologies involving national systems information flow into weapons and C4I systems to improve time critical tactical strike capabilities (Jul 95).
-- Talon Night: $2,400
--- Event: Develop and demonstrate innovative applications of national capabilities in support of FY95 Special Operations Forces (SOF) needs (Sep 95).
-- Talon Touch: $3,500
--- Event: Develop and demonstrate classified network communications architectures between Air Force Space Warfare Center and national systems organizations; results in improved TENCAP support to tactical warfighters (Sep 95).
-- Talon Vision: $1,900
--- Event: Integrate Multi-Source Tactical System (MSTS), Air Defense System Integrator (ADSI) systems, with capabilities of Information Warfare Center (IWC) (Kelly AFB, TX) (Aug 95).

(U) - Training, education, exercises and readiness of national systems: $3,583
-- Additional exercise resources programmed to support JCS Directed Special Project 95

(U) - Influence and impact new national systems: $3,000

4. (U) Program to Completion: Continuing Program.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207247F
PE Title: AF TENCAP
Project Number: 0001
Budget Activity: 7 -- Operational Systems Development
Old Budget Activity: #4-Tactical Programs
Date: February 1994

D. (U) WORK PERFORMED BY: The TENCAP program is executed through a combination of existing contracts, collateral contract vehicles managed by Air Force laboratories and program offices, and new TENCAP contracts issued during FY94.

- (U) Existing Contacts: McDonnell Douglas, Tysons Corner, VA; Autometric Corp, Alexandria, VA; Space Applications Corp, Vienna, VA; and GeoDynamic Corp, Colorado Springs, CO.
- (U) Supporting organizations: Space and Missile Center, Los Angeles AFB, CA; Wright Laboratory, Dayton, OH; Phillips Laboratory, Albuquerque, NM, Electronic Systems Center, Boston, MA.
- (U) Future Contracts: To be Determined in FY94.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: TENCAP was restructured in FY94 to meet the warfighters needs to exploit national systems and impact future systems. Program restructure was based on two drivers: (1) AF TENCAP lessons from Desert Storm, and (2) significant changes taking place in national systems. Old Talon projects have been organized under six enduring areas of interest to meet the warfighters needs. These six areas have been given Space Command code names as "Talon Programs", and will be funded each fiscal year.

- (U) 4 Warfighting Talon Programs:
  - (U) Talon Command: Provides warfighters with national systems information integrated into command and control systems.
  - (U) Talon Ready: Provides warfighters with national systems information to support Mission Planning, and rehearsal systems.
  - (U) Talon Shooter: Increases Combat capabilities with real-time national systems information in the cockpit and out of the cockpit to weapons/C4I systems.
  - (U) Talon Night: Exploits national systems for Special Operations Forces and other low-visibility operational forces.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207247F
PE Title: AF TENCAP
Project Number: 0001
Budget Activity: 7 -- Operational Systems Development
Old Budget Activity: #4-Tactical Programs
Date: February 1994

(U) Talon Vision: Supports the four warfighting Talon programs by applying innovative hardware and software technology to connect the warfighter with national systems.

F. (U) PROGRAM DOCUMENTATION: N/A

G. (U) RELATED ACTIVITIES:

(U) Program Element 0305159I, Defense Reconnaissance Support Program (DRSP)
(U) Program Element 0305158F, Constant Source
(U) Program Element 0304111F, Special Activities
(U) Program Element 0301313F, Defense Dissemination System
(U) To influence future national systems, TENCAP interfaces with numerous national programs/agencies, the Major Commands, the Air Staff, and the other services.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appn: 3080, Budget Activity: #3, AF TENCAP								
129	0	200	200	200	200	200	Cont	Cont

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None (due to classified activities).

J. (U) MILESTONE SCHEDULE: N/A

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207412F
Date: February 1994
PE Title: Theater Air Control System Improvements (TACSI)
Budget Activity : # 7 - Operational Systems Development
Old Budget Activity : # 4 - Tactical Programs

A: (U) RESOURCES ($ in Thouands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
22,634	28,215	7,383	291	654	751	844	0	249,500

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Theater Air Control System (TACS) provides the means through which the Air Component Commander exercises control of his forces to accomplish his assigned mission. This program provides for major improvements to the existing TACS which was designed in the 1960s and is now unsupportable. The Theater Air Control System Improvements (TACSI) RDT&E program consists primarily of Modular Control Equipment (MCE) Pre-Planned Product Improvements (P3I) program. The P3I program is structured into multi-phase segments. The first phase consisted of the integration of secure anti-jam UHF (HAVE QUICK) radios, an upgrade to the weapons control and Joint Tactical Air Operations (JTAO) data link software (S/W), development of an AN/TPS-75 radar interface and development of a Chemical, Biological and Radiological (CBR) protection capability. These improvements have already been incorporated into the MCE production line. The current R&D includes the integration of a Joint Tactical Information Distribution System (JTIDS)/Tactical Digital Information Link-J (TADIL-J) capability, the integration of an Automated Air Tasking Order (AATO) capability, integration of secure anti-jam VHF (SINCGARS) radios and upgrades to the Ground Mobile Forces/Satellite Communications (GMF/SATCOM) digital communications interfaces. The next planned phase includes a software upgrade to the TADIL-J Reissue 2 baseline, which works towards a Theater Missile Defense capability and the implementation of the Interim JTIDS Message Specification (IJMS) capability. The TACSI program element also includes production of JTIDS terminals, JTIDS Modules (JMs) and JTIDS Interface boxes (JIBs), all of which are required to integrate JTIDS into the MCE. Category of Research: Operational Systems Development. TACS is a fielded, operational system currently undergoing major modifications/upgrades.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

Program Element: 0207412F **Date:** February 1994
PE Title: Theater Air Control System Improvements (TACSI)
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

(U) FY 1993 Accomplishments ($ in Millions):
(U) - Complete hardware testing. ($10.0)
(U) - Continue software development and testing. ($12.6)

(U) FY 1994 Plans:
(U) - Complete MCE P3I software through final version 107. ($22.1)
(U) - Develop JTIDS digital data bus (DDB) and fiber optic interfaces. ($2.3)
(U) - Develop JTIDS Modules (JM). ($1.5)
(U) - AATO development. ($2.3)

(U) FY 1995 Plans:
(U) - Develop JTIDS digital data bus (DDB) and fiber optic interfaces. ($2.7)
(U) - Develop JTIDS Modules (JM). ($1.8)
(U) - AATO development. ($2.8)

(U) Work Performed By: The MCE P3I and TACSI programs are managed by the Electronic System Center (ESC), Hanscom AFB MA. The MCE P3I contractor is Litton Data Systems in Agoura Hills CA. The JTIDS Terminal contractors are Rockwell-Collins of Cedar Rapids IA and GEC-Marconi Electronic Systems Corp. of Totowa NJ.

(U) Related Activities:
(U) - PE 0206626M, Tactical Air Operations Module (TAOM) is a joint USAF/USMC program. The TAOM/MCE contract is administered by the USMC under a Memorandum of Agreement between the Navy and the Air Force.
(U) - PE 27438F, Theater Battle Management C4I, upgrades the Air Component Commander's Operations Center. The commander uses the deployable unit to plan air tasking orders and execute all aspects of the C2 air war.
(U) - MCE P3I integrates PE 0604771D and 0604754F, the Joint Tactical Information Distribution System (JTIDS) terminals and provides secure anti-jam VHF radios via PE 0207423F, the Single Channel Ground and Airborne Radio System

Program Element: 0207412F
Date: February 1994
PE Title: Theater Air Control System Improvements (TACSI)
Budget Activity : # 7 - Operational Systems Development
Old Budget Activity : # 4 - Tactical Programs

(SINCGARS).

(U) - $95M of Air National Guard (ANG) FY92 funds will purchase 14 additional MCE production Operations Modules essential for ANG unique requirements.

(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, Budget Activity 3, Program Title TACSI								
72,800	5,800	63,800	26,000	22,700	26,100	22,500	CONT	TBD

(U) International Cooperative Agreements: Not Applicable

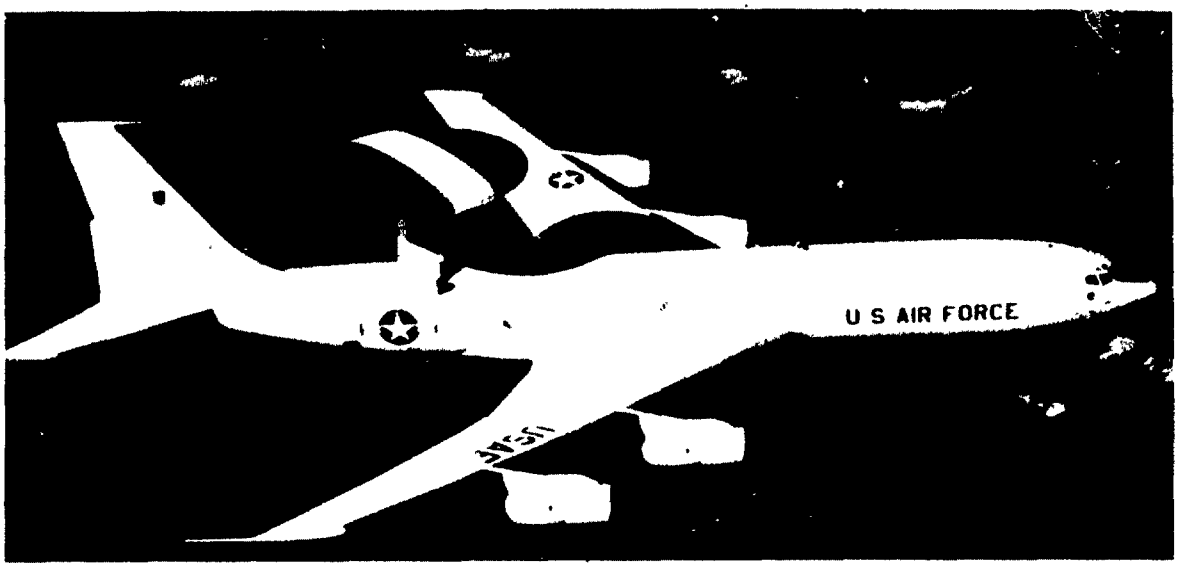
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207417F
PE Title: Airborne Warning and Control System

Project Number: N/A
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #4-Tactical Programs

Date: February, 1994

Project Title: Airborne Early Warning & Control (AWACS)



Program Element: #0207417F
PE Title: Airborne Warning and Control System
Project Number: N/A
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #4-Tactical Programs
Date: February, 1994

POPULAR NAME: E-3 Sentry

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones			Block 30/35 MS IIIB Nov 94	RSIP MS III Nov 95	Block 30/35 IOC (5AC) 4Qtr		RSIP IOC (4AC) 2Qtr	
Engineering Milestones	RSIP Final SW Test May							
T&E Milestones		Start RSIP DT&E Flt Jan	Start RSIP IOT&E Aug					
Contract Milestones	Block 30/35 Grp B Award Trial Inst May	Block 30/35 Grp A Award Trial Inst Jan	Blk 30/35 Prod Awd Full Rt Nov					
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**F 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	41,207	65,226	61,367	49,185	327	300	300	217,912 (0)
Support Contract	6, 669	3,599	7,821	9,708	13,655	11,091	12,351	80,894 (16,000)
In-House Contract	15,052	16,069	16,455	7,795	6,010	2,926	4,951	79,258 (10,000)
GFE/Other	0	0	0	0				0 (0)
Total	62, 927	84,894	85,643	66,688	19,992	14,317	17,602	378,064 (26,000)

Program Element: #0207417F **Project Number: N/A** **Date: February, 1994**
PE Title: Airborne Warning and Control System **Budget Activity: #7 Operational Systems Development**
Old Budget Activity: #4-Tactical Programs

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program develops and integrates system improvements which will enable the E-3 AWACS to remain an effective, survivable airborne surveillance system for command and control of tactical forces and for strategic defense of the United States. These improvements include Electronic Support Measures (ESM), central computer memory upgrade, Joint Tactical Information Distribution System (JTIDS) Class 2H/TADIL J and NAVSTAR Global Positioning System (GPS) terminal integrations (collectively known as Block 30/35); the Radar System Improvement Program (RSIP); and HAVE QUICK A-Nets. RSIP will restore required E-3 surveillance capability against the evolving threats posed by low radar cross section fighters and cruise missiles, improve Electronic Counter Counter Measures (ECCM), reliability and maintainability, and enhanced man-machine interface. Category of Research: Operational Systems Development. AWACS is a fielded, operational system currently undergoing major modifications/block upgrades.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Block 30/35 trial installation with the fabrication of the Group A, ESM, CC-2E and JTIDS Group B hardware. ($35,784)
   - (U) - RSIP EMD completed the remaining two US and one NATO kits. ($15,434)
   - (U) - Other miscellaneous efforts.(Low cost Mods: HQ A-Net, Wide Band Klystron, Test System -3 (TS-3) support and sustaining) ($11,626)

2. (U) FY 1994 Planned Program:
   - (U) - Block 30/35 activities include completion of FCA, completion of ESM IOT&E ($41,427)
   - (U) - RSIP activities include continuation of DT&E ground testing including reliability verification tests and environmental qualification tests, begin a 12 month, 74 flight DT&E program. ($37,600)
   - (U) - Other miscellaneous efforts. ($5,867)

Program Element: #0207417F **Project Number: N/A** **Date: February, 1994**
PE Title: Airborne Warning and Control System **Budget Activity: #7 Operational Systems Development**
Old Budget Activity: #4-Tactical Programs

3. (U) FY 1995 Planned Program:
   - (U) - Block 30/35 activities include completion of Milestone IIIB, Full Rate Production, starting trial installation of mod kit into an operational aircraft, compete ESM PCA, begin production kit lot buys, begin upgrade of FIT and Mission Simulator #1, and start upgrade of the Avionics Integration Support Facility (AISF) to provide an ESM software maintenance capability. ($33,445+ production)
   - (U) - RSIP activities include completion of DT flight tests and start of IOT&E, start ramp-up in In-House Support for RSIP test activities, FCA/PCA, depot maintenance capability development, and NATO involvement in the RSIP program. ($42,100)
   - (U) - Wide Band Klystron will begin production procurement.
   - (U) - Other miscellaneous efforts. ($10.098)

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

D. (U) WORK PERFORMED BY: The AWACS Integrated Weapon System Program Office (ESC/AW) at Hanscom AFB MA manages the overall AWACS program. ESC/AW and the NATO Airborne Early Warning and Control Program Management Agency (NAPMA), Brunssum, Netherlands, jointly manage the ESM and RSIP cooperative development programs. The major contractors are the Boeing Aerospace Company, Seattle WA (air vehicle and system integration & test); Westinghouse Electric Corporation, Baltimore MD (radar); IBM, Owego NY (Data Processor); and GEC-Marconi (leader), Little Falls NJ and Rockwell-Collins (follower), Cedar Rapids IA (JTIDS).

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None

Program Element: #0207417F **Project Number: N/A** **Date: February, 1994**
PE Title: Airborne Warning and Control System **Budget Activity: #7 Operational Systems Development**
Old Budget Activity: #4-Tactical Programs

3. (U) COST CHANGES: Net change FY95 +$1.145M, total net change +$2.014 as follows: FY94 reduction of $2.172 for PBD 632 (allocation of FFRDC/non FFRDC reduction) and FY95-FY99 increases of $4.186M for PBD 604 (Non-pay inflation and non-pay purchases inflation)

F. PROGRAM DOCUMENTATION:
- (U) ROC No: ADC/TAC-1-66 (S), 1 Sep 66
- (U) DCP No. 5, Rev 4, E3-A (AWACS) Program (S), 6 Mar 80
- (U) Block 30/35 Acquisition Plan 86-AP-019, 14 Nov 85, and J&A 86-J&A-019, 16 Sep 85.
- (U) USAF-NAPMO Cooperative R&D Agreement for E-3 ESM, 17 Nov 86
- (U) SORD for E-3 RSIP, TAF(TAC 001-66)-I,II,III-A, Revision 2, 4 Feb 92.
- (U) RSIP Acquisition Plan 89-AP-014, 7 May 89 and J&A 89-J&A-OA, 7 May 89
- (U) USAF--NAPMO Cooperative R&D Agreement for E-3 RSIP, 7 May 92.
- (U) PMD 2057 (59) October 1, 1993

G. RELATED ACTIVITIES:
- (U) Program Element #0604771D,(Common JTIDS), funding for the development of the JTIDS Class 2H terminal required for TADIL J.
- (U) Program Element #0305164F,(NAVSTAR GPS User Equipment), funding for the development of the Global Positioning System (GPS) user equipment.
- (U) Program Element #0207423F, (Advanced Communications Systems), funding for the development of the HAVE QUICK radios.
- (U) United Kingdom and France direct commercial E-3 purchases include, and are dependent upon, the USAF-developed E-3 integration of the JTIDS Class 2H/TADIL J terminal and central computer memory upgrade
- (U) NATO cooperative participation in RSIP. UK and French participation in RSIP is also being discussed
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0207417F **Project Number:** N/A **Date:** February, 1994
PE Title: Airborne Warning and Control System **Budget Activity:** #7 Operational Systems Development
Old Budget Activity: #4-Tactical Programs

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity BP 1100/1600, Program Title Airborne Warning & Control System								
Class V Mod/ICS								
75,380	4,641	137,570	202,528	266,430	81,670	68,790	Cont.	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The United States and the North Atlantic Treaty Organization (NATO) are jointly developing and integrating a common ESM package for US and NATO E-3 aircraft. Boeing Aerospace Company, Seattle, WA is the prime contractor for ESM integration, and UTL Corporation, Dallas, TX, is the major US vendor for the ESM equipment. Total EMD cost is estimated at $200 million with NATO contributing a 35% share. The US and NATO are also cooperatively developing the E-3 RSIP. The RSIP cooperative agreement was signed on 7 May 92. The United Kingdom, and France have indicated a desire to participate in the RSIP program and other US E-3 improvements. Discussions on participation are continuing and the USAF and OSD/ISA are working to develop a U.S. position.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
RSIP Brass Bd Flt Testing 2	2Q/FY91	Successful
Block 30/35 DT&E/IOT&E	Sep 1990-Sep 1992	Successful
RSIP Software Demo #3	Aug 1993	Successful

Program Element: #0207417F
PE Title: Airborne Warning and Control System

Project Number: N/A
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #4-Tactical Programs

Date: February, 1994

T&E ACTIVITY (TO COMPLETION)

Event	Date
RSIP DT&E	2Q FY94-2Q FY95
RSIP IOT&E	4Q FY95-3Q FY96

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207419F
PE Title: Tactical Airborne Battlefield Command and Control System (ABCCC)
Budget Activity : # 7 - Operational Systems Development
Old Budget Activity : # 4 - Tactical Programs

Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
4133 Airborne Battlefield Command and Control Center Improvements								
5,958	0	2,779	2,106	360	0	0	0	11,115

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Airborne Battlefield Command and Control Center (ABCCC) provides rapid worldwide Command, Control, and Communications (C3) capabilities to the Air Force Component Commander or Joint Task Force (JTF) Commander during combat or contingency operations. ABCCC extends ground based C3 capabilities and can function in a stand alone mode during the absence of ground based C3I units. The primary mission of the ABCCC is to provide on-scene tactical battle management for Combat Air Forces. It receives target nominations from the Air Operations Center (AOC) or other C3I systems (Joint Surveillance Target Attack Radar System (JSTARS), Air Support Operations Center (ASOC), etc.) and assigns direct air, sea, and land operations to developing targets in the theater of operations. It can also function as a direct extension of the AOC, an airborne ASOC, or the Air Component Commander's operations center. ABCCC supports functions across a broad spectrum of operations from Forward Battle Coordination and coordination of Joint Forces to Close Air Support (CAS), Air Drops, Search and Rescue (SAR), and Crisis Management. ABCCC has been battle proven in Vietnam, Grenada, Panama, and Operation Desert Storm. Pre-planned product improvements (P3I) include integration of the Joint Tactical Information Distribution System (JTIDS), the Air Force Airborne Single Channel Ground and Air Radio System (SINGARS), and upgrade to satellite communications (SATCOM) capabilities. Future P3I requirements include integration of the Multi-mission Advance Tactical Terminal (MATT) to receive CONSTANT SOURCE information, integration of Battlefield Communication Terminals (BCT)/Improved Data Modem (IDM), interface to Air Force Mission Support System (AFMSS), and integration of Automated Communication Processor

Program Element: 0207419F
PE Title: Tactical Airborne Battlefield Command and Control System (ABCCC)
Budget Activity : # 7 - Operational Systems Development
Old Budget Activity : # 4 - Tactical Programs

Date: February 1994

(ACP). Category of Research: Operational Systems Development. ABCCC is a fielded, operational system currently undergoing major upgrades.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) PE #0207419F, Tactical Airborne Command and Control System:
The ABCCC Improvements program continues the modernization and upgrade of ABCCC equipment to increase system capabilities and enhance compatibility and integration with other C3 systems; i.e., Airborne Warning and Control System (AWACS), AOC, ASOC, JSTARS, Modular Control Equipment (MCE), etc. These P3I efforts will enhance the system's communications, control, and information collection and dissemination capabilities through increased automation, advanced anti-jam communications capabilities and data links so that ABCCC can more efficiently handle the growing volume of information exchanged in the projected threat environment.

(U) FY 1993 Accomplishments:
(U) - Continue JTIDS integration through prototype installation, Developmental Test & Evaluation (DT&E)/Initial Operational Test & Evaluation (IOT&E), Functional Configuration Audit/Physical Configuration Audit (FCA/PCA) and initial flight test and evaluation. This will complete JTIDS RDT&E through First Article integration and testing. ($5.958M)

(U) FY 1994 Plans:
(U) - No FY 1994 RDT&E funds.

(U) FY 1995 Plans:
(U) - Initiate Air Force Airborne SINCGARS (AFABS) integration design. ($2.779M)

(U) Work Performed By: : Electronic Systems Center, Air Force Material Command (AFMC), Hanscom AFB MA manages the program. The JTIDS integration contractor is Paramax Systems Corporation (a UNISYS owned company), St. Paul MN. The AFABS integration contract has not been awarded.

Program Element: 0207419F **Date:** February 1994
PE Title: Tactical Airborne Battlefield Command and Control System (ABCCC)
Budget Activity : # 7 - Operational Systems Development
Old Budget Activity : # 4 - Tactical Programs

(U) Related Activities:

(U) - Program Element #027423F, develops AFABS Radios.
(U) - Program Element #0604774D, Joint Tactical Information Distribution System (JTIDS) develops the Class II terminals.
(U) - Program Element #0604754F, JTIDS funds AF JTIDS integration.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 0505, WSC C13000 C-130, Program Title ABCCC								
1,988	1,912	4,064	4,907	0	0	0	0	12,654

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207422F
PE Title: Deployable C3 Systems
Budget Activity: 7. Operational Systems Dev
Old Budget Activity: 4. Tactical Programs

Date: February, 1994

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

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Theater Deployable Communications								
0	0	2,610	1,723	1,708	3,058	3,013	12,688	24,800

B. (U) BRIEF DESCRIPTION OF ELEMENT: The program element provides funding for the research, development, test and evaluation for the modernization of deployable communications equipment that supports tactical air operations in a combat environment. This includes deployable communications equipment for active duty, Air National Guard combat communications and Theater Air Control System units. The equipment ranges from small, unit-level packages that deploy for initial communications, up to base-level packages that provide long-term (sustaining) support. Category of research is "Operational Systems Development 6.7", because the program procures commercial-off-the-shelf (COTS) equipment and production funds have been included in the DOD budget submission.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) **Project Number and Title:** (#Not yet assigned) - Theater Deployable Communications (TDC): As clearly demonstrated during Desert Shield/Desert Storm (DS/DS), today's generation of deployable communications equipment is bulky, inflexible in design and does not meet today's projected airlift availability or interoperability standards. Funds requested in this program element are to complete joint interoperability certification testing, begin development and implementation of integrated network management software, and to support field activities and conduct integration activities. This program will

Program Element: #0207422F
PE Title: Deployable C3 Systems
Budget Activity: 7, Operational Systems Dev
Old Budget Activity: 4, Tactical Programs

Date: February, 1994

research COTS equipment that will, with minimal development, either augment existing assets or replace tactical communications systems with a family of lightweight, modular, fully integrated, deployable communications packages. The resulting TDC packages will reduce airlift requirements and be designed to support a wide range of operational scenarios during deployment/employment, expansion and sustaining operations.

(U) **FY 1993 Accomplishments:**
- (U) Not Applicable.

(U) **FY 1994 Plans:**
- (U) Not Applicable.

(U) **FY 1995 Plans:**
- (U) Complete joint interoperability certification testing ($1.5M)
- (U) Begin development of integrated network management software ($0.6M)
- (U) Support field activities and conduct integration activities ($0.5M)

(U) **Work Performed By:** This program is managed by the Electronic Systems Center, Hanscom AFB, MA. The contractors are to-be-determined. Engineering support is provided by the MITRE Corporation, Bedford, MA and various other engineering support contractors. Joint interoperability testing will be conducted by the Joint Interoperability Test Center, Ft Huachuca, AZ, and the Air Force Operational Test and Evaluation Center, Kirtland, NM.

(U) **Related Activities:**
- (U) Program Element #0207423F, develops advanced communications systems.
- (U) Program Element #0207438F, develops theater battle management command, control, communications, computer, and intelligence systems.
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

Program Element: #0207422F
PE Title: Deployable C3 Systems
Budget Activity: 7. Operational Systems Dev
Old Budget Activity: 4. Tactical Programs

Date: February, 1994

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation 3080, Budget Activity 3 - Electronics & Telecommunications, Program Title: Theater Deployable Communications								
11,400	15,102	28,656	16,436	16,504	28,061	28,528	298,613	443,300
Appropriation 3400, Budget Activity 3 - Electronics & Telecommunications, Program Title: Theater Deployable Communications								
0	0	1,715	4,881	8,196	11,663	17,671	89,374	133,500

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207423F
PE Title: Advanced Communications Systems
Budget Activity : # 7 Operational Systems Development
Old Budget Activity : # 4 - Tactical Programs

Date: February 1994

A: (U) RESOURCES ($ in Thouands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2982	Anti-Jam Communications							
471	377	459	444	420	419	467	0	3,099

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Advanced Communication Systems program develops and procures jam resistant UHF and VHF frequency hopping tactical radios. The HAVE QUICK UHF radios provide the primary Air Force and DOD UHF Electronic Counter-Countermeasures (ECCM) voice communications. SINCGARS (Single Channel Ground and Airborne Radio System) provides anti-jam, VHF frequency hopping voice and data communications and is the primary means of ECCM communications between Air Force, Army, USMC aircraft and ground units involved in close air support and joint battlefield operations. RDT&E funds in this program element are used to examine appropriate emerging technologies, provide software development support for the HAVE QUICK family of radios. Category of Research: Operational Systems Development. HAVE QUICK is a fielded, operational system currently undergoing upgrades. SINCGARS is in the final stages of the Engineering and Manufacturing Development (EMD) Phase. Production funds have been included in its DoD budget submission.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) Project 2982, Anti-Jam Communications:
The fast paced development of new frequency hopping radio technologies by potentially hostile nations dictates that the U.S. maintain a technological lead. UHF frequency hopping voice radios are needed for jam resistant communications between tactical aircraft and airborne and ground control elements. The HAVE QUICK wave form used in these radios is the NATO

standard for UHF anti-jam communications. VHF frequency hopping radios provide direct communications between air and ground forces, primarily for missions involving direct interoperability such as Close Air Support, air drop and resupply.

(U) FY 1993 Accomplishments:
(U) - Continue software support for the HAVE QUICK II radios. ($240)
(U) - Investigate improvements in anti-jam performance and other techniques to improve general system performance. ($133)
(U) - Conduct Phase II Qualification Testing for Airborne SINCGARS. Phase II consists of reliability and flight testing (Airborne SINCGARS Modification Program). ($98)

(U) FY 1994 Plans:
(U) - Continue software support for the HAVE QUICK II radios. ($100)
(U) - Investigate improvements in anti-jam performance and other anti-jam techniques. ($177)
(U) - Support remainder of SINCGARS Phase II Qualification Testing and support platform integration analyses. ($100)

(U)) FY 1995 Plans:
(U) - Continue software support for the HAVE QUICK II radios. ($109)
(U) - Continue investigating improvements in anti-jam performance and other anti-jam techniques. ($250)
(U) - Support SINCGARS fielding and platform integration analyses. ($100)

(U) Work Performed By: Electronic Systems Center, Air Force Material Command (AFMC), Hanscom AFB MA manages the program. There are no Research & Development contractors. Magnavox Electronic Systems Corporation, Ft Wayne IN has the Firm Fixed Price contract for the AF Airborne SINCGARS radio modification program and the ARC-164 controls program. Collins Avionics and Communications Division, Rockwell International has the contract for the GRC-171B(V)4, the HAVE QUICK ground equipment.

(U) Related Activities:
(U) Army PE #644805A, SINCGARS. The Air Force is buying ground SINCGARS radios through the Army.
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: 0207423F
Date: February 1994
PE Title: Advanced CommunicationsSystems
Budget Activity : # 7 - Operational Systems Development
Old Budget Activity : # 4 - Tactical Programs

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 5, Program Title Modifications								
9,965	18,398	1,567	1,507	0	0	0	0	31,363
Appropriation 3080, Budget Activity 3, BPAC 838090/837904, Program Title Anti-Jam Voice, and Initial Spares								
6,658	10,163	928	7,020	8,204	4,369	4,219	0	39,265

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207438F **Date: February 1994**
PE Title: Theater Battle Management C4I (TBM C4I)
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
4287 Contingency Theater Automated Planning System (CTAPS)								
0	8,588	21,538	12,754	15,624	3,623	2,720	Cont	64,847
4288 Wing Command and Control System (WCCS)								
0	3,341	3,592	3,777	3,691	3,893	4,118	Cont	22,412
3330 Command and Control Information Processing System (C2IPS)								
12,198*	10,714*	8,827	2,025	0	0	0	Cont	33,764
Total								
12,198	22,643	33,957	18,556	19,315	7,516	6,838	Cont	121,023

* FY93 & 94 RDT&E funds for C2IPS are in PE 0401840F

B. (U) BRIEF DESCRIPTION OF ELEMENT: As a result of the CSAF Command and Control Communications, Computers and Intelligence (C4I) Review in Sep 92, a new program element was required to consolidate and standardize the Air Force Theater Battle Management (TBM) Command and Control (C2) programs. To reflect this consolidation, the title for PE 27438F has been changed to TBM C4I. Beginning in FY94, CTAPS funding was transferred from PE 27412F into PE 27438F. Beginning in FY95, C2IPS funding will be transferred from PE 41840F into PE 27438F. This program is funded under Budget Activity 7, Operational Systems Development, since its multiple C2 development programs are in engineering and manufacturing development and are now being fielded

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

using an evolutionary acquisition strategy. These programs are being developed within the CTAPS architecture identified as the Air Force standard for theater command and control. In Aug 93, JCS/J6 identified the CTAPS Air Tasking Order (ATO) planning/processing software modules as the joint standard for JFACC ATO production and management. The WCCS is the unit level implementation of CTAPS. CTAPS/WCCS is designed to open system standards that allow increased interoperability and compatibility with joint service and Allied systems. C2IPS is the Air Mobility Command (AMC) unit level C2 system supporting the worldwide airlift mission planning and execution from force level to unit level, within a unit, and between units. In FY94, these programs began implementing force and unit level migration strategies to merge the best features of existing systems. In addition, these programs will use evolutionary acquisition strategies that will accommodate changes in user requirements and improvements in commercial technology through a series of planned incremental software releases. In FY 95, CTAPS has a ramp-up of RDT&E funds. The 26 May 93 CTAPS In Process Review identified a $9.3M shortfall in RDT&E funds. This shortfall would delay automation of the Air Support Operations Center and initial fielding; delay fielding of the common view of the battlefield in the Joint Force Air Component Commander (JFACC) headquarters; delay implementation of Defense Mapping System and DoD database standards which will impact joint systems integration and interoperability; and delay development of an imagery processing and distribution capability (imagery limited to force level intelligence only, limited unit level distribution).

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)

Project Number: 4287
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: Contingency Theater Automated Planning System (CTAPS)

PHOTO NOT AVAILABLE

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4287
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

POPULAR NAME: CTAPS

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones				S/W Version 6.0 - 2nd Qtr ASOC IOC	S/W Version 7.0 - 4th Qtr	S/W Version 8.0 - 2nd Qtr	MS IV 4th Qtr	
Engineering Milestones		Evolutionary/ Incremental Development						
T&E Milestones		Operational Effectiveness Demo - 1st Qtr		DT&E 1 - 2nd Qtr	DT&E 2 - 4th Qtr		DT&E 3 - 2nd Qtr	DT&E 4 - 4th Qtr FY01
Contract Milestones		Bridge CA - 1st Qtr	Major Contract Award - 1st Qtr Bridge Complete - 3rd Qtr					Complete - 4th Qtr FY02
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	0	5,210	18,428	9,430	12,144	2,754	2,068	Continuing
Support Contract	0	2,218	1,950	2,274	2,334	588	442	Continuing
In-House Contract	0	0	0	0	0	0	0	0

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4287
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

GFE/Other	0	1,160	1,245	1,050	1,146	280	210	Continuing
Total	0	8,588	21,538	12,754	15,624	3,623	2,720	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The CTAPS program directly supports the Joint Forces Air Component Commander in the planning and execution of the theater air campaign down to the unit level. The system is designed to open systems standards promoting interoperability among USAF, Services, and Allied command and control systems. The air tasking order generation and dissemination capabilities of CTAPS are the standard for all DOD command and control systems. The program utilizes an evolutionary acquisition strategy that accommodates changes in user requirements and improvements in commercial technology through a series of planned incremental software releases. In FY94, this program began implementing force and unit level migration strategies to merge the best features of existing systems, eliminate redundancy, and improve interoperability. FY 95 RDT&E funding ramp-up addresses the $9.3M shortfall identified in the 26 May 93 CTAPS In Process Review. The shortfall would delay automation of the Air Support Operations Center and initial fielding; delay fielding of the common view of the battlefield in the Joint Force Air Component Commander (JFACC) headquarters; delay implementation of Defense Mapping-System and DoD database standards which will impact joint systems integration and interoperability; and delay development of an imagery processing and distribution capability (imagery limited to force level intelligence only, limited unit level distribution). This program is funded under Budget Activity 7, Operational Systems Development, since it is in engineering and manufacturing development and is now being fielded using an evolutionary acquisition strategy.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   (U) - Not Applicable.

2. (U) FY 1994 Planned Program:
   (U) - Begin development of Battlefield Situation Display (BSD) module for CTAPS. ($1,025K)
   (U) - Begin development of CTAPS Air Support Operations Center (ASOC) upgrade. ($480K)

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4287
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

(U) - Perform Pre-Planned Product Improvements (P3I) of existing software modules. ($860K)
(U) - Complete Joint Tactical Information Distribution System (JTIDS) integration to the Modular Air Operations Center (MAOC) Phase I development. ($395K)
(U) - Begin implementation of force and unit level migration strategies. ($2,450K)
(U) - Systems engineering. ($3,378K)

3. (U) FY 1995 Planned Program:
(U) - Complete technical baselining. ($2,000K)
(U) - Continue ASOC development. ($1,079K)
(U) - Continue software version 6.0. ($8,372K)
(U) - Continue P3I of existing software modules. ($2,592K)
(U) - Continue development of BSD module for CTAPS. ($2,800K)
(U) - Continue implementation of force and unit level migration strategies. ($1,500K)
(U) - Systems engineering. ($3,195K)

4. (U) Program to Completion:
(U) - Complete BSD development. ($2,902K)
(U) - Complete ASOC development. ($1,739K)
(U) - Release upgraded software versions. ($18,332K)
(U) - Continue implementation of force and unit level migration strategies. ($2,418K)
(U) - Perform P3I of existing software modules. ($4,179K)
(U) - Systems engineering. ($5,151K)
(U) - This is a continuing program.

D. (U) WORK PERFORMED BY: The CTAPS program tasks have been transferred from Air Combat Command (ACC) to Electronic Systems Center (ESC), Hanscom AFB MA. Sierra Nevada, Reno NV, is contractor for Modular Air Operations Center (MAOC) shelters and Science Applications International Corporation (SAIC), Hampton VA, is software integration contractor for MAOC.

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4287
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Software Version Releases 6 and 7 delayed one year (FY95 to FY96 and FY96 to FY97) due to ACC direction to focus on maintenance of software prior to adding new operator functionality. This resulted in the planning for two maintenance releases instead of the traditional single maintenance release.
2. (U) SCHEDULE CHANGES: Major Contract Award delayed from 4th Qtr FY94 to 1st Qtr FY95 due to PEO direction to include the incorporatoin of Wing Command and Control System (WCCS) into the CTAPS architecture.
3. (U) COST CHANGES: FY94 funds reduced $0.6M due to Federally Funded Research and Development Center (FFRDC) and non-FFRDC cuts. FY95 funds increased $8.3M, to remove shortfall presented at the May 1993 CTAPS/WCCS In Process Review. This shortfall would delay automation of the Air Support Operations Center and initial fielding; delay fielding of the common view of the battlefield in the Joint Force Air Component Commander (JFACC) headquarters; delay implementation of Defense Mapping System and DoD database standards which will impact joint systems integration and interoperability; and delay development of an imagery processing and distribution capability (imagery limited to force level intelligence only, limited unit level distribution).

F. (U) PROGRAM DOCUMENTATION:

- (U) MNS 2/89
- (U) SORD 2/91
- (U) PMD 2328(1)/27438F 9/93

G. (U) RELATED ACTIVITIES:

- (U) Program Element #0401840F, Air Mobility Command and Control Information Processing System (C2IPS) provides interoperability with airlift elements.
- (U) Program Element #0604321F, Tactical Fusion, funds the development of the Intelligence Correlation Module (ICM) and integration with CTAPS.

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4287
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

- (U) Program Element #0603617F, C3 Applications, funds the transition of developments in the Science & Technology base (e.g., Advanced Planning System (APS)) to upgrade existing C3 warfighting capability).
- (U) Program Element #0207431F, Sentinel Byte, provides fused intelligence data input to CTAPS.
- (U) Program Element #0208006F, Air Force Mission Planning System (AFMSS), provides mission planning interface between unit level and weapon systems.
- (U) Program Element #0604231N, Navy Tactical Command System - Afloat (NTCS-A).
- (U) Program Element #0203740A, Maneuver Control System (MCS).
- (U) Program Element #0604719M, Advanced Tactical Air Command Central System (ATACCS).
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: Other Procurement, Budget Activity: 833040, Program Title: CTAPS								
20,785*	25,490	31,731	41,967	34,462	23,321	13,299	Cont	191,055
4/0	6**/0	7/0	3/3	2/2	2/1	1/1	Cont	38***/7

MAOC/ASOC
* Also funds CTAPS hardware for PACAF. Will support CTIS prior to CTAPS implementation at PACAF.
** FY94 includes 4 MAOC shelters with installation hardware plus installation hardware equivalent to the makeup of two shelters; FY95 and beyond funds installation hardware only, quantities shown in shelter equivalents.
*** FY98 and beyond funds unsheltered hardware replacement.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4287
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

J. (U) TEST AND EVALUATION DATA: Managed by HQ ACC/DRC, the CTAPS program has been tested in a DT&E mode extensively by developers and the integration contractor, SAIC, as well as the 1912th Computer Systems Group at Langley AFB VA. An Operational Effectiveness Demonstration (OED) was conducted by the USAF Air Warfare Center, as directed by HQ ACC. New PMD guidance directs AFOTEC to conduct OT&E in the future. Specific planning will be accomplished in the near future.

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
DT&E	Numerous in past 3 years through 5.0	Satisfactory to field CTAPS versions
OED	Nov 91	Satisfactory
OED	Nov 93	Will be published in February 1994

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
DT&E 1	2nd Qtr FY96	
DT&E 2	4th Qtr FY98	
DT&E 3	2nd Qtr FY99	
DT&E 4	4th Qtr FY01	
OT&E	TBD	

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4288
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

Project Title: Wing Command and Control System (WCCS)

PHOTO NOT AVAILABLE

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)

Project Number: 4288
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

POPULAR NAME: WCCS

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones		*S/W Release 1 0 IOC 3rd Qtr	S/W Release 2.0	S/W Release 3 0	S/W Release 4.0	S/W Release 5.0	S/W Release 6.0	S/W Releases 7 0 - 10.0
Engineering Milestones								
T&E Milestones		Operational Capability Assessment - Feb						
Contract Milestones		Utilizes existing federal contracts						
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	0	3,341	3,592	3,777	3,691	3,893	4,118	Continuing
Support Contract	0	0	0	0	0	0	0	0
In-House Contract	0	0	0	0	0	0	0	0
GFE/Other	0	0	0	0	0	0	0	0
Total	0	3,341	3,592	3,777	3,691	3,893	4,118	Continuing

* Due to revised IOC criteria, software releases were rebaselined. Last year's summary reflects prior baseline.

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4288
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project includes development of mission critical application software for WCCS operating on commercially available hardware and system software. It is funded under Budget Activity 7, Operational Systems Development, since it is in engineering and manufacturing development and is now being fielded using an evolutionary acquisition strategy. Wing commanders require an accurate, composite picture of their wing's total resources to effectively command, control, and manage their forces in support of their combat sortie generation and reporting responsibilities. The introduction of increasingly sophisticated weapon systems, with their need for and ability to produce large amount of data, require an automated C2 system to bring meaningful, consolidated information to the commander in near real-time. Today, this information is relayed over secure and unsecure telephones, radios, and other communication devices, as well as by runners to update multi-user status displays (grease boards) or hand written logs. These techniques, which have not changed substantially since World War II, are cumbersome, error prone, may compromise sensitive information, and involve duplication of effort. Disparate efforts have led to the proliferation of stovepipe systems which inherently do not provide interoperability and do not adequately meet the needs of today's air operations. The WCCS program will design, develop and implement an automated, standard wing level C2 system, that will be tailored to meet unique MAJCOM and wing requirements, in order to provide interoperability and reduce training and development costs. Key functional areas (operations, maintenance, mission planning, intelligence, weather, etc) use WCCS to support the wing commander in mission execution and the reporting process by exchanging critical command and control and intelligence information with functional counterparts located throughout the wing.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   (U) - Not Applicable.

2. (U) FY 1994 Planned Program:
   (U) - Complete WCCS application software release 1.0 (note: Program was rebaselined to reflect revised IOC criteria. ($2,441K)
   -- Release to enhance scheduling and Air Tasking Order processing capabilities
   -- Release to include graphic user interface and other "user-friendly" improvements
   -- Release to include interface to critical unit and force-level systems
   (U) - Begin implementation of force and unit level migration strategies. ($500K)
   (U) - Perform Pre-Planned Product Improvements (P3I) of existing software modules. ($400K)

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)

Project Number: 4288
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

3. (U) FY 1995 Planned Program:
   - (U) - Complete WCCS application software release 2.0. ($2,192K)
     - -- Release to include a graphic Maintenance Operations Center (MOC) capability
     - -- Release to include the first phase of the Decision Support System (DSS) module
     - -- Release to include expnaded business graphics
     - -- Release to include tanker, transport, bomber scheduling
     - -- Release to include interfaces to critical unit/force/theater level systems
   - (U) - Continue implementation of force and unit level migration strategies. ($1,000K)
     - -- Interface to include battlefield situation display
   - (U) - Perform P3I of existing software modules. ($400K)

4. (U) Program to Completion:
   - (U) - Complete WCCS application software release 3.0 - FY96 ($3,000K)
     - -- Release to include more graphic user interfaces
     - -- Release to include the second phase of the Decision Support (DSS) module
     - -- Release to include interfaces to critical unit/force/theater level systems
     - -- Release to include first phase of multi-level security (MLS) implementation.
   - (U) - Complete WCCS applications software releases 4.0 - 10.0 with additional functionality as directed by the operational wing commander through the WCCS Requirements Management Board (WRB). Releases to include MLS phases 2 -4. ($7,090K)
   - (U) - Continue implementation of force and unit level migration strategies ($3,327K)
   - (U) - Perform P3I of existing software modules. ($2,062K)
   - (U) - This is a continuing program.

D. (U) WORK PERFORMED BY: The WCCS System Program Office, Standard Systems Center, Maxwell AFB-Gunter Annex AL, is responsible for overall system development, integration testing, and installation. The prime contractor is Science Applications International Corporation (SAIC) and work is performed at San Diego CA and Montgomery AL. Software development is also performed by the 1912th Communications Support Group (CSGP), Langley AFB VA.

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)

Project Number: 4288
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: N/A
2. (U) SCHEDULE CHANGES: N/A
3. (U) COST CHANGES: N/A

F. (U) PROGRAM DOCUMENTATION:

- SON 12/89
- ORD 3/92
- PMD 2328(1)/27438F 9/93

G. (U) RELATED ACTIVITIES:
- (U) See project 4287, CTAPS

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: Other Procurement, Budget Activity: 837100, Program Title: WCCS								
3,087	21,356	13,816	14,392	14,260	14,887	16,081	Cont	97,879
4*	7	3	3	3	3	3	21	47

* Limited initial installations at Whiteman AFB, Seymour-Johnson AFB, Barksdale AFB, and Mountain Home AFB

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 4288
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Not applicable		

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
Operational Capability Assessment	Feb 94 (IOC)	Validate Initial Operational Capability

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)

Project Number: 3330
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: Command and Control Information Processing System (C2IPS)

PHOTO NOT AVAILABLE

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 3330
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

POPULAR NAME: C2IPS

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	* MAISRC IPR - Jun		Milestone IIIB - Oct	FOC - 3rd Qtr				
Engineering Milestones	INC2 PDR - Feb INC2 CDR - Aug	INC3 PDR - Mar INC3 CDR - Sep	INC4 PDR - Sep	INC4 CDR - Nov				
T&E Milestones		INC2 OT&E - Mar	INC3 OT&E - 1st Qtr	INC4 OT&E - 2nd Qtr				
Contract Milestones		INC3 Software Spec Rvw - Jun	INC4 Software Spec Rvw - 4th Qtr					
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	6,131	6,762	5,326	0	0	0	0	0
Support Contract	4,983	2,912	2,901	1,667	0	0	0	0
In-House Contract	1,084	1,040	600	358	0	0	0	0
GFE/Other	0	0	0	0	0	0	0	0
Total	12,198	10,714	8,827	2,025	0	0	0	0

*MAISRC IPR - Major Automated Information Systems Review Council In Process Review

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 3330
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Information Processing System (IPS) program develops communications and information processing hardware and software for all echelons of the Air Mobility Command (AMC) Command and Control (C2) system. It satisfies essential elements of the AMC C2 architecture validated in AMC Statement of Need (SON) 3-81. This program is funded under Budget Activity 7, Operational Systems Development, since it is in engineering and manufacturing development and is now being fielded using an evolutionary acquisition strategy. The integration of IPS computer resources and software with improved High Frequency (HF) equipment, new Ultra High Frequency (UHF) satellite networks, and other available communications media will result in a unified AMC C2 system. The IPS will be developed and installed in four increments. Increment 1 will provide a digital data message handling capability at each IPS node and implement mission execution monitoring. Increment 2 will build on Increment 1 software to support mission planning and scheduling. Increments 3 & 4 will augment the planning and scheduling capabilities of Increment 2 as well as install Satellite Communications (SATCOM) communications interfaces and multi-level security features. As a result of the Chief of Staff, United States Air Force (CSAF) Command, Control, Communications, Computers, and Intelligence (C4I) Broad Area Review (BAR), an initiative was set forth to improve theater C4I by coordinating and integrating on-going and planned development activities in an effort to eliminate redundancy in TBM architecture and reduce proliferation of computer systems. Air Force directed the development and implementation of an incremental migration strategy to merge the best features of IPS and two other MAJCOM initiatives into the design for a single wing-level C2 system.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Continued Increment 2 software development. ($12,000K)
     - -- Completed Increment 2 Software Specification Review (SSR)
     - -- Completed Increment 2 software Preliminary and Critical Design Reviews
   - (U) - Conducted the Major Automated Information Systems Review Council (MAISRC) Milestone IIIA review. (No funding)
   - (U) - Initiated Increment 3 software development. ($198K)

2. (U) FY 1994 Planned Program:

Program Element: #0207438F **Project Number:** 3330 **Date:** February 1994
PE Title: Theater Battle Management C4I (TBM C4I) **Budget Activity :** #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

(U) - Complete Increment 2 software development and upgrade software at installed nodes to Increment 2. ($2,700K)
(U) - Continue Increment 3 software development. ($6,014K)
-- Complete Increment 3 software Preliminary and Critical Design Reviews
(U) - Begin implementation of force and unit level migration strategies. ($1,900K)
(U) - Initiate Increment 4 software development. ($100K)

3. (U) FY 1995 Planned Program:
(U) - Complete Increment 3 software development. ($2,377K)
(U) - Continue Increment 4 software development. ($2,000K)
-- Complete Increment 4 software Preliminary Design Review
(U) - Continue implementation of force and unit level migration strategies. ($4,450K)
(U) - Conduct the MAISRC Milestone IIIB review. (No funding)

4. (U) Program to Completion:
(U) - Complete Increment 4 software Critical Design Review. ($1,600K)
-- Software Final Operational Capability (FOC)
(U) - Continue implementation of force and unit level migration strategies ($400)

D. (U) WORK PERFORMED BY: The IPS program is managed by Electronic Systems Center, Hanscom AFB MA. The IPS contractor is Computer Sciences Corporation (CSC), Moorestown New Jersey.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)

Project Number: 3330
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

3. (U) COST CHANGES: FY94 funds reduced $0.6M due to Federally Funded Research and Development Center (FFRDC) and non-FFRDC cuts. FY95 funds increased $1M to offset the FY94 reduction.

F. (U) PROGRAM DOCUMENTATION:

- (U) SON 3/81
- (U) SORD 6/91
- (U) ORD 4/93
- (U) PMD 2328(1)/27438F 9/93

G. (U) RELATED ACTIVITIES:

- (U) Program Element #0603617F, C3 Applications, funds the transition of developments in the Science & Technology base to upgrade existing C3 warfighting capability.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: Other Procurement, Budget Activity: 834070, Program Title: C2IPS								
19,195	19,182	8,158	8,218	9,798	9,664	8,452	Cont	82,667
29*[1]	11	8	8	9	21	22	50	169

* Unit cost depends on procured IPS configuration
[1] 20 new nodes, 9 HAVE IPS retrofits

Program Element: #0207438F
PE Title: Theater Battle Management C4I (TBM C4I)
Project Number: 3330
Budget Activity : #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
IOT&E INC 1	Apr 92	IOT&E successfully completed at McGuire AFB

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
OT&E INC2	1st Qtr FY94	INC 2 OT&E delayed 11 months due to contractor problems with INC1 software development
OT&E INC3	1st Qtr FY95	
OT&E INC4	2nd Qtr FY96	

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207590F **Date: February 1994**
PE Title: SEEK EAGLE
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
4037	SEEK EAGLE Certifications							
22,954	15,019	15,982	16,215	14,302	12,725	13,047	Cont.	TBD
4038	SEEK EAGLE Technology Applications							
6,022	0	0	0	0	0	0	0	6,022
Total								
28,976	15,019	15,982	16,215	14,302	12,725	13,047	Cont.	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Air Force SEEK EAGLE program certifies weapons and other stores for use on operational aircraft. The program completes these certifications through any combination of ground and flight testing, wind tunnel testing, and engineering analysis. The SEEK EAGLE technology application efforts develop and insert technologies into the SEEK EAGLE process, significantly reducing certification cost and time.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995

(U) Project 4038, SEEK EAGLE Technology Applications: The purpose of the SEEK EAGLE technology application project is to fund insertion of new and emerging technologies into the SEEK EAGLE process, and provide resources for sustainment of a viable Air Force aircraft-store certification capability. Insertion of new and emerging technologies into the process will result in significant savings in cost and time required for completion of aircraft-stores certifications. Once these projects are developed for Air Force use, they will be "transported" to other services as required using OSD funds. This will make the Air Force developed program compatible with the other services' computers, software, and methods of completing aircraft-stores certification. There is no duplication of any effort between the Air Force Technology Applications Project and the OSD Central Test and Evaluation Investments Program (CTEIP), PE 0604940D. OSD will also fund the technology transfer of the Navy managed High Speed Video Project and Army

Program Element: 0207590F **Date: February 1994**
PE Title: SEEK EAGLE
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

managed Rotary Wing Store Integration to the Air Force for application to the SEEK EAGLE certification process. Implementing each of these projects into the SEEK EAGLE process will save both time and money in the aircraft-store certification process, reducing typical certification times from years to months, and even weeks, with significant related cost savings. Project 4038 was absorbed into Project 4037 effective in FY94.

(U) FY 1993 Accomplishments:
(U) - Performed proof of concept and insertion of maturing technologies into the certification process for projects funded in FY 1990 and FY 1991. These included Computerized Physical Fit , Integrated Stores Separation Ballistics Accuracy/Test Station concept, Aerodynamic Analysis/Computation Fluid Dynamics, and the SEEK EAGLE Database. (ECD: FY93) ($5522)
(U) - Developed an aircraft-store flutter parametric analysis tool and assessed Munition Fragmentation Models for use in aircraft-store certification. (ECD: FY93) ($500)

(U) FY 1994 Plans:
(U) - Not Applicable

(U) FY 1995 Plans:
(U) - Not Applicable

(U) Work Performed By: SEEK EAGLE Technology Application work is a combination of in-house effort at the Air Force Development Test Center, Eglin AFB FL, and contracted effort performed by Calspan, Tullahoma TN; Orlando Technologies, Inc., Orlando FL; Lockheed, Ft Worth TX; and Science Applications International Corporation, Seattle WA. The Air Force SEEK EAGLE Office at Eglin AFB FL, manages these technology application programs.

(U) Related Activities:
(U) - SEEK EAGLE modernization relates to, and is integrated with, PE 0604940D, Central Test and Evaluation Investment Program.
(U) - There is no unnecessary duplication of effort within the Air Force or Department of Defense.

Program Element: 0207590F
PE Title: SEEK EAGLE
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands): Not Applicable

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0207590F
PE Title: SEEK EAGLE
Project Number: 4037
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
4037	SEEK EAGLE Certifications							
22,954	15,019	15,982	16,215	14,302	12,725	13,047	Cont.	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Air Force has a variety of combat aircraft and numerous stores and stores types (munitions, missiles, fuel tanks, electronic countermeasures pods, etc.). Aircraft can carry these stores in many different loading configurations which are determined by operational scenarios, missions, and tactics. The loading configurations change as operational plan and tactics change, and as new aircraft and stores are developed. Before operational use, the Air Force must certify these configurations for safe loading, carriage, and separation (jettison and normal release), and must verify ballistics accuracy under the user-specified carriage and employment parameters. The Air Force SEEK EAGLE program completes these certifications through any combination of ground testing, flight testing, wind tunnel testing, and engineering analysis. There are currently over 700 aircraft-store configurations to be certified, with new ones added on a regular basis. Depending on complexity, certifications can take from months to years.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Initiated/continued/completed aircraft-stores certification of conventional weapons on bomber aircraft, including completing certification of MK-20, BSU-85/93, and the BDU-48 on the B-52 and beginning certification of the CBU-87/89/97 and the MK-82 on the B-1B. ($200)
   - (U) - Initiated/continued/completed aircraft-stores certification on fighter aircraft, including completing certification of the BLU-109 and F-16 Block 30/32 and the AIM-120/LAU-106 on the F-15E and continuing certification of the AGM-130 on the F-15E. ($17,754)
   - (U) - Maintained SEEK EAGLE engineering analysis capability. ($5000)

Program Element: 0207590F
PE Title: SEEK EAGLE
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

2. (U) FY 1994 Planned Program:
   (U) - Initiate/continue/complete aircraft-stores certification of conventional weapons on bomber aircraft, including continuing the certification of the CBU-87/89/97 and M-82 on the B-1B. ($5279)
   (U) - Initiate/continue/complete aircraft-stores certification on fighter aircraft, including beginning F-111 mixed load certification and completing F-16C/D AIM-120 flutter testing and F-16 Block 50 instrumentation. ($8740)
   (U) - Maintain SEEK EAGLE engineering analysis capability. ($1000)

3. (U) FY 1995 Planned Program:
   (U) - Initiate/continue/complete aircraft-stores certification of conventional weapons on bomber aircraft, including conducting CBU-87/89/97 separation tests and MK-82 and CBU-87/89/97 ballistics accuracy verification (BAV) on the B-1B. ($2746)
   (U) - Initiate/continue/complete aircraft-stores certification on fighter aircraft, including beginning F-16C/D/AIM-120CC testing. ($12,136)
   (U) - Maintain SEEK EAGLE engineering analysis capability. ($1100)

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

D. (U) WORK PERFORMED BY: SEEK EAGLE certification work is performed both under contract with prime airframe contractors and through Air Force in-house engineering and test organizations. The Air Force SEEK EAGLE process is managed by the Air Force SEEK EAGLE Office at Eglin AFB FL. Two of the prime contractors are Lockheed, Ft Worth TX, in support of the F-16, and McDonnell Douglas, St Louis MO, for the F-15E. Much of the work, however, is done in-house at such locations as the Air Force Development Test Center, Eglin AFB FL; Air Force Flight Test Center, Edwards AFB CA; Ogden Air Logistics Center (ALC), Hill AFB UT; and the Air Force Fighter Weapons Center, Nellis AFB NV.

Program Element: 0207590F
PE Title: SEEK EAGLE
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: F-16 Block 50 instrumentation slipped 1 1/2 months due to modification of facility priorities, certification of MK-82 AIR on B-52 slipped from Jun 93 to Nov 93 due to a delay in release of mission planning software.

3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION: The SEEK EAGLE program does not have its own Mission Need Statement or Operational Requirements Document (ORD); however, individual system ORDs contain early SEEK EAGLE requirements. Additionally, certification requirements are generated via SEEK EAGLE Requests from Air Combat Command (as focal point for the Combat Air Forces), Air Force Mobility Command, Air Force Special Operations Command, and the HQ Air Force Directorate for International Programs for FMS programs.

G. (U) RELATED ACTIVITIES: SEEK EAGLE relates to OSD PE 0604940D, project No. 1-05-F, Central Test & Evaluation Investment, Weapons Modification and Simulation Capability (WMASC) project. Improvements to the aircraft-stores certification process developed under SEEK EAGLE will be transitioned to the Army and Navy aircraft-stores certification communities under WMASC funding. The technology transfer methodology is defined in MOAs established under WMASC. Portions of SEEK EAGLE Technology Improvement Projects were funded during the early study phase by PE 0604940D, Central Test and Evaluation Program. There is no duplication of effort between the two SEEK EAGLE Technology Application projects.

Program Element: 0207590F **Date: February 1994**
PE Title: SEEK EAGLE
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3020, Missile Procurement, AF								
0	13,788	6,699	6,864	18,465	25,293	26,278	Cont.	TBD
Appropriation 3080, Other Procurement, AF								
1,352	2,000	0	0	0	0	0	0	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) MILESTONE SCHEDULE: Each of the SEEK EAGLE Requests from the Air Force operational commands or HQ USAF/IAP (for FMS customers) has a user need date. Key milestones such as engineering analysis, ground test, Operational Flight Program update, and Technical Order publication are established for approximately 700 requested loading configurations, but are too numerous to list.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0207601F
PE Title: USAF Wargaming and Simulation
Project Number: #1008
Date: February 1994
Budget Activity: #6 RDT&E Management Support
Old Budget Activity: #6 Defensewide Management and Support

A: (U) RESOURCES ($ In Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Popular Name								
National Air and Space Warfare Model (NASM)								
0	11,509	19,110	6,700	6,562	5,662	0	0	49,543

B: (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The PE consists of O&M and procurement funding entirely for the operation of three Air Force wargaming centers (Warrior Preparation Center (WPC), Einsiedlerhof AFS, Germany; the Air Force Wargaming Institute, Maxwell AFB, AL; and the USAF Battlestaff Training School (BLUE FLAG), Hurlburt Field, FL) and RDT&E funding for Air Force and Joint wargaming architecture and model development, primarily in support of battlestaff training, education, and military operations. First year of execution for the PE is FY94. Program element replaces Program Decision Package T632 and was created by the consolidation of funding from PEs 27597 and 84751. By centralizing O&M and Procurement funding, the Air Force more efficiently manages existing wargaming and simulation resources while ensuring developmental activities are responsive to evolving Air Force, Joint, and DoD M&S requirements and capabilities. The PE also includes RDT&E funding to replace the existing Air Force standard Air Warfare Simulation (AWSIM) system with a new wargaming model, NASM. For FY 95/96, the NASM development project consists entirely of RDT&E funds and is completely separate from ongoing O&M for the three wargaming centers. NASM includes an overall USAF Modeling and Simulation (M&S) architecture and provides a reusable, portable, scalable, robust distributed core for other simulations. NASM/W will be an air combat resolution model to meet the needs of USAF MAJCOMs and Unified/Specified Command air components to train Air Component Commanders and their battle staffs. Primary users will be unified command air components, CINCs, JFACCs, and Service components, as supported by BLUE FLAG and WPC for use in joint exercises involving air, ground, and sea campaigns.

Program Element: #0207601F
PE Title: USAF Wargaming and Simulation

Project Number: #1008 **Date:** February 1994
Budget Activity: #6 RDT&E Management Support
Old Budget Activity: #6 Defensewide Management and Support

C: (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program: Not Applicable.

2. (U) FY 1994 Planned Program:

(U) - Initiate rapid development of higher risk NASM requirements (1,000)
(U) - Initiate rapid prototyping of NASM architectural elements (1,000)
(U) - Establish a full NASM program management office, including USAF change management component (1,500)
(U) - Complete the Program Start Review and Acquisition Panel (73)
(U) - Participate in Joint M&S Architecture development activities (1,000)
(U) - Develop and complete NASM target architecture (1,000)
(U) - Complete NASM/W Concept of Engineering (1,000)
(U) - Complete NASM/W RFP (900)
(U) - Release final NASM/W RFP (100)
(U) - Award NASM/W development contract (4,000)

3. (U) FY 1995 Planned Program:

(U) - Complete NASM/W initial prototype(s) (1,000)
(U) - Incorporate technological developments and evolving requirements (2,000)
(U) - Monitor NASM/W contract (8,854)
(U) - Continue development of architecture and prototypes (4,000)
(U) - Continue change management activities (1,000)

Program Element: #0207601F
PE Title: USAF Wargaming and Simulation

Project Number: #1008 **Date: February 1994**
Budget Activity: #6 RDT&E Management Support
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(U) - Work with user community and operational centers to further define object characteristics (1,000)
(U) - Continue working Joint and USAF M&S architectural issues (1,000)

4. (U) Program to Completion:

(U) - Complete NASM/W development contract and testing, including embedded AWSIM functional equivalency (6,859)
(U) - Incorporate C4I interoperability into NASM (2,000)
(U) - Perform user training (1,500)
(U) - Transition operations and management to user community (1,500)
(U) - This will be a continuing program

D. (U) WORK PERFORMED BY: The Air Force Materiel Command (AFMC), Electronic Systems Center (ESC), Command and Control Systems Program Office (AV), Hanscom AFB, MA, is the Program Manager for NASM; currently no contractor(s) have been selected to support this effort.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Increased NASM scope to include change management. NASM became the AF-wide architecture. NASM/W became the wargaming component of NASM; the campaign-level constructive model for the AF.
2. (U) SCHEDULE CHANGES: Minor delay in schedule (i.e., release of RFP, contract award, etc.) due to funding.
3. (U) COST CHANGES: Not Applicable

Program Element: #0207601F
PE Title: USAF Wargaming and Simulation

Project Number: #1008 **Date:** February 1994
Budget Activity: #6 RDT&E Management Support
Old Budget Activity: #6 Defensewide Management and Support

F. (U) PROGRAM DOCUMENTATION:

(U) - CSRD TAC-LANGLEY-92-9022
(U) - Independent Cost Estimate, 1 Oct 92
(U) - Draft NASM/W System Specification (ESC SPEC, NASM-SS-001),16 Oct 92
(U) - Draft NASM/W Request For Proposal, 27 Aug 93

G. (U) RELATED ACTIVITIES:

- (U) J-MASS is the tri-Service Joint Modeling and Simulation System Program. The program goals include providing the DoD with the structure and software tools necessary to reduce modeling and simulation (M&S) development and operating costs, increase performance and credibility of models, increase responsiveness to user requirements, and decrease duplication.

  J-MASS is an object-oriented modeling system designed to support engineers, model developers, analysts, and decision makers. It implements a series of standards and provides software tools supporting the development, configuration, operation, and analysis of models and simulation at varying levels of complexity and detail. In addition, J-MASS provides a library of verified and validated software components for the model designers to use. J-MASS uses Ada, the Dod standard software language, and an object based design. J-MASS was originally developed for analysis models to support the Test and Evaluation community; however, it is now being investigated as a possible framework for constructive models with multiple resolutions and scalable execution time frames.

- (U) Louisiana Maneuver (LAM) is the Army's pathway of change from acquisition to warfighting. The charter of LAM is to energize and guide the restructuring of the Army while simultaneously keeping it combat ready. LAM is an evaluation vehicle to assess new ideas in real time and shortcut Cold War policy decision methodologies. The Battle Laboratories practice roles and missions to develop and explore options for decision making by senior leaders.

Program Element: #0207601F
PE Title: USAF Wargaming and Simulation

Project Number: #1008 **Date:** February 1994
Budget Activity: #6 RDT&E Management Support
Old Budget Activity: #6 Defensewide Management and Support

- (U) MAGTF (Marine Air Ground Task Force) Tactical Warfare Simulation (MTWS) is computer- assisted Command and Control combat training system for use with command post exercise (CPX) and field exercises (FEX). MTWS provides the marine commander and his staff with a realistic combat environment for them to plan and conduct amphibious, ground, and air operations.

- (U) WARSIM 2000 is a replacement of the Corps Battle Simulation (CBS) which provide the warfighters the simulation tools they can use to create realistic operational conditions for training commanders and battle staffs to win the information war. It provides STRICOM with a baseline for technical analysis and program planning. WARSIM 2000 defines the training environment as a complete system of models, hardware, databases, and support. The goals are to link distributed simulations that support joint force training; representations of combat that have been tested and are trusted by the warfighters; and expanding infrastructure of equipment and knowledge for employing simulations.

- (U) Distributed Interactive Simulation (DIS) is a set of standards for linking independently developed simulation systems which include live, virtual, and constructive systems. It defines and describes the Protocol Data Units (PDU). The overall concept of DIS is to support multiple distance location simultaneously; provide a valid, coherent synthetic environment; and support the broadest range of user needs. Primary focus is on connectivity of virtual simulations, with planned extensions to live and constructive simulations.

- (U) ENWGS (Enhanced Navy Wargaming System) is the Navy's standard wargaming model to replace the interim Research, Evaluation, and Systems Analysis (RESA) model. RESA is a research and evaluation tool for systems analysis and testing associated with naval command, control, and communications systems. It is also used for operation plan evaluation, command and control training support for senior officers, joint C3 interoperability assessment, warfare systems architecture analysis, and wargaming support. The domain is naval and air operations with limited land warfare modeling. The focus is on naval battle group/force operations in the theater context.

Program Element: #0207601F
PE Title: USAF Wargaming and Simulation

Project Number: #1008 **Date: February 1994**
Budget Activity: #6 RDT&E Management Support
Old Budget Activity: #6 Defensewide Management and Support

(U) Aggregate Level Simulation Protocol (ALSP), an Army led program with multi-service participation to develop and field constructive simulation interface protocols, coordinate Service and Joint Agency simulation enhancements, and provide ALSP system level software to support an integrated multi-function training environment for joint and combined exercises. ALSP will only be used for interim inter-model interoperability with legacy Joint, Service and DoD agency models to comply with the Joint M&S Architecture. NASM will provide a distributed robust core standards-based object communications for new and evolving threats.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation O&M								
6,554	8,640	11,352	11,805	11,461	11,607	11,621	Cont	TBD
Appropriation, Other Procurement (3080)								
0	683	664	673	701	719	746	Cont	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

Program Element: #0207601F
PE Title: USAF Wargaming and Simulation

Project Number: #1008 **Date:** February 1994
Budget Activity: #6 RDT&E Management Support
Old Budget Activity: #6 Defensewide Management and Support

J. (U) MILESTONE SCHEDULE:

NASM/W RFP Release	May 94
NASM/W Contract Award	Sep 94
Initial NASM/W Prototype	Sep 95
NASM/W System Testing	Jun 97
NASM/W Initial Operational Capability (IOC)	Sep 97
NASM/W Final Operating Capability (FOC)	Sep 98
NASM/W Organic Air Force Maintenance Begins	Feb 99

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0208006F
Date: February 1994
PE Title: Mission Planning Systems
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3857	Conventional Mission Planning and Preparation System (CMPPS)							
1,900	0,000	0,000	0,000	0,000	0,000	0,000	0,000	6,968
3858	Air Force Mission Support System (AFMSS)							
12,580	16,051	9,720	13,695	12,111	11,948	11,790	Cont	TBD
3769	Mission Data Preparation System (MDPS) (formerly under PE: 11313F)							
0.000	7.955	4.763	6.019	5.856	6.570	6.984	0.000	37.349
Total								
14,480	24,006	14,483	19,714	17,967	18,518	18,774	Cont	44,317

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Mission Planning System program was created in 1990 to consolidate ongoing, fragmented mission planning system development efforts by individual weapon system programs. Air Force Mission Support System (AFMSS) is the single squadron-level mission planning system supporting all current/future aircraft and associated weapons: A/OA-10, F-15, F-16, F-22, F/EF-111, F-117, JSTARS, AWACS, ABCCC, AGM-130/GBU-15, TSSAM, JDAM, JSOW, OBEWS, B-1, B-2, B-52, KC-10, KC/EC/RC-135, C-5, C-17, C-141, MH-47, MH-53, MH-60, and C/AC/EC/MC-130. Wartime sortie rates, sophisticated avionics, first look and/or beyond visual range target destruction, and the ability to defeat complex threat systems require a computer-aided mission planning system and digital data input to maximize the combat

Program Element: 0208006F **Date: February 1994**
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effectiveness of sophisticated aircraft/weapon systems. Conventional Mission Planning and Preparation System (CMPPS) supports near-term B-52/Tri-Service Standoff Attack Missile (TSSAM) mission planning requirements. The Mission Data Preparation System (MDPS) supports the development effort to interface the B-1 and B-52 into the common AFMSS core. Research category and budget activity 6.4 is in engineering and manufacturing development. AFMSS uses military and commercial software integrated on Commercial-Off-The-Shelf (COTS) hardware.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 3857, Conventional Mission Planning and Preparation System (CMPPS): The purpose is to enhance CMPPS to support interim mission planning capability for the B-52G and the TSSAM program. The B-52G is the first test and operational launch aircraft for this weapon. Aircrews cannot plan, program, and launch this standoff weapon without CMPPS, or until AFMSS comes on line.

(U) FY 1993 Accomplishments:
(U) - Tape 1.0 Format Integration/System Test. ($.9M) (Feb-Jun 93)
(U) - Tape 1.0 certification for IOT&E. ($.3M) (Jun 93)
(U) - Begin IOT&E. ($.7M) (Jul 93)

(U) FY 1994 Plans:
(U) - RFP release for Source Selection Competition. (Reduce to one contractor). (Jan 94)
(U) - Provide integration platform for TSSAM. (Sep.94)
(U) - Contract award. (Apr 94)

(U) FY 1995 Plans:
(U) - Tape 1.2 software release. (Sep 95)
(U) - Continue integration with TSSAM. (Sep 95)

(U) Program to Completion:
(U) Not Applicable.

Program Element: 0208006F **Date: February 1994**
PE Title: Mission Planning Systems
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

(U) Work Performed By: The Mission Planning System's development program is being managed by the Directorate for Mission Planning Systems, Electronic Systems Center, Hanscom AFB, Massachusetts. CMPPS contractors are Boeing Military Airplanes (BMA) of Wichita, Kansas, and McDonnell Douglas Aerospace East (MDAE) of Bellevue, Nebraska.

(U) Related Activities: There is no unnecessary duplication of effort in the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 3858 Air Force Mission Support System (AFMSS): The proliferation of former Soviet, European, and US surface to air missiles (SAM), anti-aircraft (AAA), and other lethal weapons systems throughout the third world presents a growing potential threat to the Air Force wherever it flies. AFMSS is a computer-aided mission planning system used by the pilots in the squadron to support weapon system employment. AFMSS Block A provides an interim capability for fighter aircraft by upgrading the present Mission Support System (MSS) II with increased processing speed, storage capacity, and graphics capability. AFMSS Block B is the USAF/USSOCOM common, evolutionary, open architecture system supporting A/OA-10, F-15, F-16, F-22, F/EF-111, F-117, JSTARS, AWACS, ABCCC, AGM-130/GBU-15, TSSAM, JDAM, JSOW, OBEWS, B-1, B-2, B-52, KC-10, KC/EC/RC-135, C-5, C-17, C-141, MH-47, MH-53, MH-60, and C/AC/EC/MC-130 operations. AFMSS produces Combat Mission Folders (CMFs) and programs aircraft Data Transfer Devices (DTDs). CMFs consist of maps, charts, flight logs, turn point/target imagery, weapons delivery calculations, and radar predictions. DTDs are magnetic transfer media which contain avionics, fire control computer, communications, and electronic combat information. DTDs are used to initialize aircraft computers in seconds vice minutes it would take to manually enter mission data. Wartime sortie rates, sophisticated avionics, first look and/or beyond visual range target destruction, and the ability to defeat complex enemy threat systems require a computer-aided mission planning system to maximize the combat effectiveness of sophisticated aircraft/weapon systems. AFMSS interfaces with Theater, Command, and Joint data bases to provide aircrews with the required operations, intelligence, weather, weapons, and electronic combat information to plan combat missions. The success of a combat sortie is jeopardized without AFMSS

Program Element: 0208006F **Date:** February 1994
PE Title: Mission Planning Systems
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

(U) FY 1993 Accomplishments:
(U) - AFMSS Block B deliveries started. (Sep 93)
(U) - AFMSS Block C enhancement. ($.8M) (Dec 92)
(U) - AFMSS Block C1.0 and C2.0 software development began. ($8.58M) (Apr 93)
(U) - Integrated A/OA-10, F-15, AWACS, B-52, B-1B, C-17, KC/EC/RC-135, C/AC/EC/MC-130, and C-141 modules. ($3.2M). (Sep 93)

(U) FY1994 Plans:
(U) - The FY94 RDT&E increase reflects the funding required to meet continuing ACC, AMC, and USSOCOM multistaged requirements for Air Force Mission Support System (AFMSS) core functions (air refueling, delivery, and strike planning) to support Air Force airlift, bomber, electronic combat, fighter, reconnaissance, rescue, tanker aircraft, and USSOCOM aviation assets; continuing development of C2.0 and initiating development of C3.0 software; and integrating additional aircraft/weapons/electronic system mission planning modules.
(U) - AFMSS Block C1.0 software release. ($5.3M) (Apr 94)
(U) - AFMSS Block C2.0 software development continues. ($6.8M) (continuing)
(U) - AFMSS Block C3.0 software development begins. ($1.8M) (Aug 94)
(U) - Begin integration of B-2, F-15, F-16, F-111, C-5, C-141, AGM-130, TSSAM, and MH-60 mission planning modules. Begin module development for RC-135 and MH/AH-6. Complete module development for A-10, C-17, C-130, E-3B/C/D, KC-135. Complete integration of F-15E. ($2.151M) (Oct 93)
(U) - Enhance AFMSS Core: begin airdrop planning, enhance imagery display, perspective views, flight planning in support of bombers and airlift, and system administration., Add 1553 bus interface, magnetic tape interface, CD-ROM, and modem. (continuing)

(U) FY1995 Plans:
(U) - AFMSS Block C2.0 software release. ($4.9M) (Jan 95)
(U) - AFMSS Block C3.0 software development continues. (continuing)
(U) - Complete integration of B-1, B-52, B-2, F-15A/B/C/D, F-16, F-111, C-5, C-141, AGM-130, TSSAM, and MH-60 planning modules. Complete module development for RC-135, MH/AH-6, and C-17 with DTD. Begin integration of MH/AH-6, MH-47, MH-60, F-117, and EF-111. ($4.02M) (Dec 95)

Program Element: 0208006F **Date: February 1994**
PE Title: Mission Planning Systems
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

(U) - Enhance AFMSS Core to include: completion of airdrop planning; add air refueling, weapons planning, and weapons delivery tactics; add Common Low Observable Autorouter (CLOAR); add full SCSI-2 interface. (continuing)
(U) - Acquire and begin deployment of portable Mission Planning System (PMPS). ($0.8M) (Dec 95)

(U) Program to Completion:
(U) - This is a continuing program.
(U) - AFMSS Block C3.0 software development continues.
(U) - AFMSS Block C4.0 software development begins.
(U) - Begin integration of F-16 C/D and AGM-130. Continue integration of MH/AH-6, MH-47, MH-60, F-117, and EF-111.
(U) - Continue AFMSS software and hardware enhancements to satisfy A/OA-10, F-15, F-16, F-22, F-111, F-117, JSTARS, AWACS, ABCCC, AGM-130/GBU-15, TSSAM, JDAM, JSOW, OBEWS, B-1, B-2, B-52, KC-10, KC/EC/RC-135, C-5, C-17, C-141, MH-47, MH-53, MH-60, and C/AC/EC/MC-130 requirements.

(U) Work Performed by: The Mission Planning System's enhancement program is managed by the Directorate for Mission Planning Systems, Electronic Systems Division, Hanscom AFB, Massachusetts. Contractor for the AFMSS projects is Lockheed Sanders, Nashua, New Hampshire.

(U) Related Activities: There is no unnecessary duplication of effort in the Air Force or the Department of Defense.

Program Element: 0208006F **Date:** February 1994
PE Title: Mission Planning Systems
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

(U) Other Appropriation Funds ($ in Thousands):

Appropriation 3080, Budget Activity 3, Program Title Tactical Air Control System Improvement

	FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
	25,480	19,875	22,879	19,819	19,449	20,172	20,908	Cont	148,582
Qty (Gnd)	106	79	81	57	50	47	40	88	548
Qty (Port)	0	0	102	176	203	20	267	253	1209

(U) International Cooperative Agreements: Not Applicable

3. (U) Project 3769 Mission Data Preparation System (MDPS), formerly under PE: 11313F: Supports evolving B-52/B-1 bomber aircraft and their associated weapons systems. Provides software development, integration, and update of a mission planning module to be hosted on AFMSS and continues to encompass open system architecture and common data standards. MDPS will maintain mission planning capability for conventional, nuclear, contingency, and training until AFMSS can support all A/W/E requirements.

(U) FY 1993 Accomplishments:
(U) - Not Applicable

(U) FY 1994 Plans:
(U) - Initialize conversion plan capabilities. ($3.755M) (Sep 94)
(U) - Mission Materials, Data Production (Format and Print), associated development software, and Data Transfer Unit Cartridge (DTUC) capability for B-52. ($1.7M) (Apr 94)
(U) - Mission Materials, Data Production (Format and Print), associated development software, and Data Transfer Unit Cartridge (DTUC) capability for B-1B. ($2.5M) (Sep 94)

Program Element: 0208006F **Date:** February 1994
PE Title: Mission Planning Systems
Budget Activity : #7 - Operational Systems Development
Old Budget Activity : #4 - Tactical Programs

(U) FY1995 Plans:
(U) - Continue Mission Planning conversion plan capabilities. ($.9M) (Sep 95)
(U) - Upgrade FY9 planning efforts for B-52 and complete Data Transfer Unit Cartridge (DTUC) capability. ($1.8M) (Jun 95)
(U) - Upgrade FY94 planning efforts for B-1B and complete Data Transfer Unit Cartridge (DTUC) capability. ($2.063M) (Sep 95)

(U) Program to Completion:
(U) - Continue Mission Planning conversion plan capabilities.
(U) - Initial and Full Operational Capabilities for B-52 and continue to upgrade FY95 planning efforts.
(U) - Initial and Full Operational Capabilities for B-1B and continue to upgrade FY95 planning efforts.

(U) Work Performed by: In-house (Government) by Oklahoma City-Air Logistics Center (OC-ALC), Tinker AFB, Oklahoma
(U) - B-52 (OC-ALC/LAH)
(U) - B-1B (OC-ALC/LAB)

(U) Related Activities: There is no unnecessary duplication of effort in the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0208021F **Date: February 1994**
PE Title: Electronic Combat Support
Budget Activity: 7 - Operational Systems Support
Old Budget Activity: 4 - Tactical Programs

A: (U) RESOURCES ($ in Thousands)

FY 93 Actual	FY 94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
374 - C3 PROTECTION/MULTI-MISSION, TECHNOLOGY AND SUPPORT								
2080	2279	1606	1417	1384	1435	1493	Cont	TBD
TOTAL								
2080	2279	1606	1417	1384	1435	1493	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program conducts 6-3B research, existing technology is applied to field requirements. This program accomplishes studies and develops systems to provide warning, self-protection and support to personnel and equipment against electronic combat systems employed by enemy forces. It identifies existing research and development efforts which can satisfy unfulfilled operational requirements identified by the Unified and Specified (U&S) Commands, and it makes maximum use of current service lab developments to avoid duplication and quickly bridge the gap between technology development and operational requirements. The Secretary of Defense identified the need for this capability in 1983, and in 1986, with unanimous approval of the services and U&S Commands, JCS made the Systems Engineering (SE) function a permanent part of the Joint Electronic Warfare Center (JEWC) mission. The Air Force, as executive agent, is responsible for the total funding of this essential effort.

Program Element: 0208021F **Date:** February 1994
PE Title: Electronic Combat Support
Budget Activity: 7 - Operational Systems Support
Old Budget Activity: 4 - Tactical Programs

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995

Project 374, C3 PROTECTION/MULTI-MISSION, TECHNOLOGY, & SUPPORT: Develops engineering capabilities to match EW operational programs with quick, off-the-shelf existing technology.

(U) FY 1993 Accomplishments:

(U) Completed development of a system for Fleet Marine Force Atlantic which allows Additional prototypes also purchased by Marine Force Systems Command. ($45K)

(U) Demonstrated for Joint Task Force Four (JTF-4) the feasibility of using has assumed sponsorship of the project. ($7.3K)

(U) Continued development of six The will fund the integration of these ($1038K)

(U) Initiated development of a man-portable Frequency Hopping EA system. ($250K)

(U) Began development for of support equipment to enable development of and Electronic Support systems to ensure continued friendly use of the system during hostilities. ($20K)

(U) Awarded development contract for a man-portable, modular, programmable to protect ingressing and egressing naval ($300K)

(U) Continuing development of a form/fit/function chaff cartridge for Air Mobility Command (AMC) which reduces the pyrotechnic (visual) signature and increases the dispersal of the dipoles by increasing the number of bursts per cartridge. ($335K)

Program Element: 0208021F **Date:** February 1994
PE Title: Electronic Combat Support
Budget Activity: 7 - Operational Systems Support
Old Budget Activity: 4 - Tactical Programs

(U) Improved the prototype Mobile Communications Countermeasures System (MCCS) for the Army and Marines to enable the units to jam on the move over an extended frequency range. ($5.5K)
(U) Continued development and successfully tested the off board balloon jamming system for USSTRATCOM, which included both the balloon and the jamming payload. ($60K)

(U) FY 1994 Plans:

(U) Continue testing of the off-board balloon jammer. Full scale drop test expected by January 1994. ($100K)
(U) Continue development, testing, and documentation of the manpack sized frequency hopping electronic attack system. ($150K)
(U) Continue evaluation and flight testing of the ($270K)
(U) Continue development and begin flight testing of the JAV payloads, oversee integration into the Joint UAV Program Office's systems. ($1222K)
(U) Begin testing of for naval ($7K)
(U) Begin development for USFORCECOM of a battlefield radar detector for ground troops and vehicles ($500K)
(U) Continue development of a electronic support device capable of locating ($300K)
(U) Continue to investigate technologies to support contingencies, low intensity conflict, and special operations.
(U) Continue to investigate the latest in Electro Optics and Infrared warning systems
(U) Continue to bridge the gap between the lab and the operator and continue to introduce cutting edge technology to the field and fleet through rapid prototyping of state-of-the-art equipment.

Program Element: 0208021F **Date: February 1994**
PE Title: Electronic Combat Support
Budget Activity: 7 - Operational Systems Support
Old Budget Activity: 4 - Tactical Programs

(U) FY 1995 Plans:

(U) Continue development, integration and testing of man portable frequency hopping EA system, the

(U) Continue development and flight testing of
(U) Continue testing of
(U) Continue to investigate technologies to support contingencies, low intensity conflict, and special operations forces
(U) Continue to investigate latest in Electro Optics and Infrared technologies and warning systems
(U) Continue to bridge the gap between the lab, the operator and business in order to introduce cutting edge technology to the field and fleet through rapid prototyping of state of the art equipment. Take advantage of commercialization of products traditionally thought of as defense related, i.e. MMIC and ASIC chips being utilized in civilian applications

(U) Work Performed By: The JEWC, at Kelly AFB, Texas, performs independent studies and analysis leading to the development of engineering prototypes for field demonstration/operations. When technology is available in service labs, JEWC arranges for the development of a prototype, and in conjunction with the developer, conducts testing and field demonstration. Some of these laboratories include the Air Force Geophysics Laboratory, Eglin AFB, Florida; the Naval Ocean System Center, San Diego, California; and the Naval Research Laboratory (NRL), Washington, DC. Where required technologies are not available within DOD, the JEWC manages contractual efforts to produce, test, and demonstrate prototypes. JEWC currently has an engineering support contract with Northrop Defense Systems Division (NDSD), Rolling Meadows, IL. and Southwest Research Institute (SwRI), San Antonio, TX. Under JEWC management, NDSD and SwRI perform engineering analysis, procure, fabricate, test and demonstrate engineering models to satisfy CINC identified operational shortfalls.

Program Element: 0208021F
PE Title: Electronic Combat Support
Budget Activity: 7 - Operational Systems Support
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) Related Activities:

(U) JEWC/SE programs support services and joint electronic combat (EC) programs.
(U) JEWC/SE builds upon technologies demonstrated in PE 0604270F, EW Development, and other service's related PE's.
(U) Technology development is related to that being developed in the following PE's: PE 0603711A, Aircraft Survivability Equipment; PE 00603718A, Vulnerability Susceptibility; PE 0603755A, Tactical ECM Systems; and PE 0603214N, Tactical C3 Countermeasures.
(U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriations Funds ($ in Thousands): not applicable.

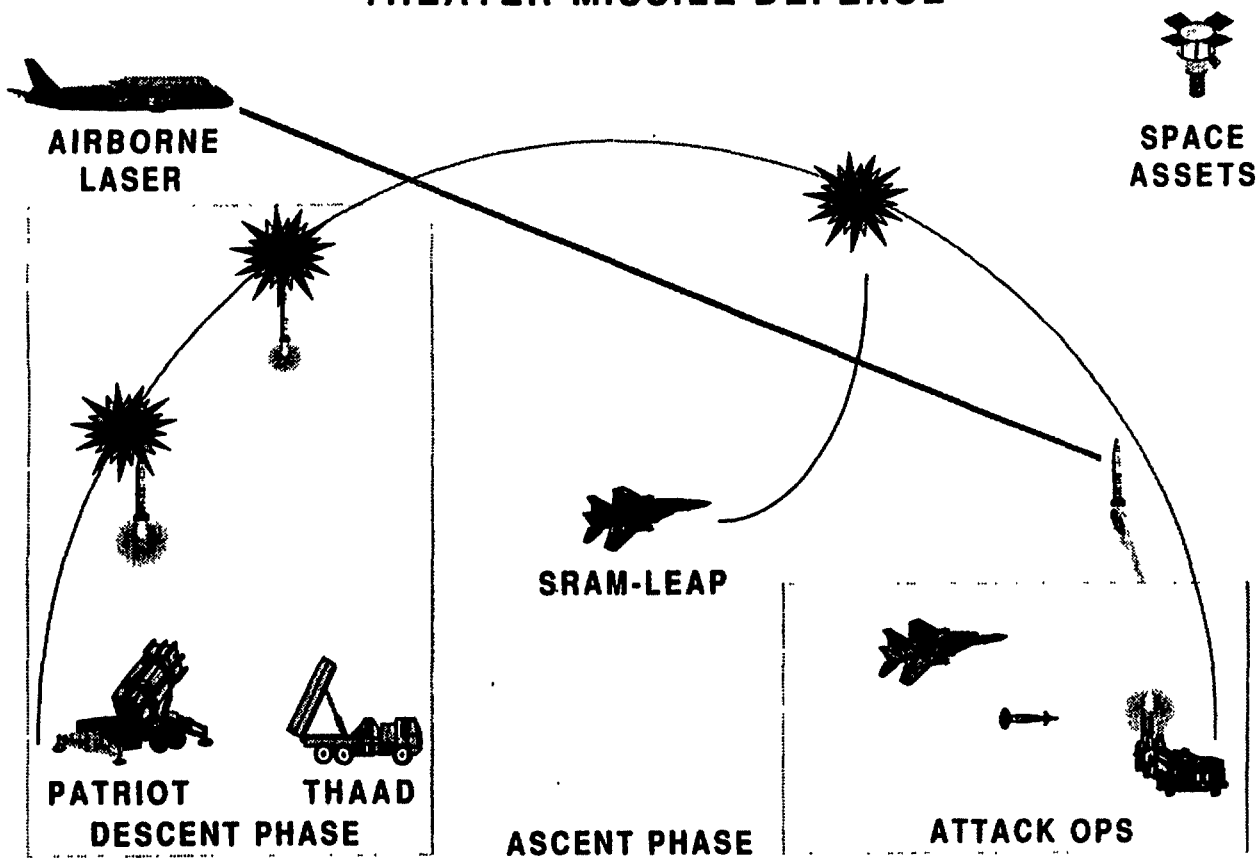
(U) International Cooperative Agreements: not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 208060F
PE Title: Theater Missile Defense

Project Number: 1014 **Date:** February 18, 1994
Budget Activity: 7(Operational Systems Dev)
Old Budget Activity: 4(Tactical Systems)

THEATER MISSILE DEFENSE



FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 208060F
PE Title: Theater Missile Defense

Project Number: 1014 **Date:** February 1994
Budget Activity: 7(Operational Systems Dev)
Old Budget Activity: 4(Tactical Systems)

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Theater Missile Defense								
0.0	0.0*	79302	88822	87926	52481	53507	Cont	TBD

*PE's 27411F and 63617F fund TMD in FY94. See FY94 Planned Program and Related Activities for descriptions of the specific tasks associated with these Program Elements.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Air Force Theater Missile Defense is focused on two layers of defense against the massive world-wide proliferation of missile technologies. First, a near-term capability to kill theater missiles (ballistic, cruise and surface-to-air) in the ascent (exo- and endo-atmospheric) phase with a path to incorporate technologies for a boost phase intercept capability. Second, improvements to existing attack operations capability to detect, locate, and kill critical mobile targets on the ground. The effort requires improvements in theater sensors, cueing schemes, battle-management, as well as stream-lined command and control concepts inherent in the reduced Command, Control, Communication, Computers and Intelligence (C4I) timelines associated with the theater missile threat. The Air Force program is based upon the significant value added of a multi-layered defense; reducing leakage and increasing the probability of kill of theater missiles. The program provides the theater CINCs a wide range of capability to counter a growing threat, as well as a deterrent to enemy use of weapons of mass destruction during theater conflicts. This program is research category 6.2.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: ($ in Thousands)

1. (U) FY 1993 Program: Not Applicable

Program Element: 208060F
PE Title: Theater Missile Defense

Project Number: 1014 **Date:** February 1994
Budget Activity: 7(Operational Systems Dev)
Old Budget Activity: 4(Tactical Systems)

2. (U) FY 1994 Planned Program: (FY94 Dollars are reflected in PE 27411F and 63617F under TMD)
   - (U) - Initiate TMD prototyping to investigate how to integrate sensor improvements (e.g., Synthetic Aperture Radar (SAR) and Moving Target Indicator (MTI) into automated C3 applications. ($3900)
   - (U) - Explore technologies, begin select upgrades, and continue operational concept demonstrations to support requirements analysis and contingency capability. ($7200)
   - (U) - Begin modeling, simulation and analysis of C4I and weapon systems supporting continued CONOPS development. ($5400)
3. (U) FY1995 Planned Program:
   - (U) - Integrate efforts of the intelligence community (DIA, HQ AF/IN, Army Intelligence, etc.) to provide improved intelligence to the battlefield. ($250)
   - (U) - Continue automatic target recognition (ATR) improvements and investigate performance capabilities with theater sensors. ($8800)
   - (U) - Conduct operational concept demonstrations and participate in CINC exercises to illustrate and integrate current TMD technologies for operational feasibility, to include MTI capability and C4I upgrades.($2600)
   - (U) - Initiate near-term ascent phase interceptor demonstration and aircraft integration. ($52000)
   - (U) - Conduct modeling, simulation, and analysis of the architectures for attack operations and active defense, focusing on reducing C3I timelines, battle management, sensor capabilities, intelligence preparation, data fusion/correlation. ($5442)
   - (U) - Continue development and demonstration of theater sensors for TMD attack operations and active defense applications. Conduct modeling, simulation and analysis of future technologies and concepts to improve target acquisition. ($3610)
   - (U) - Continue upgrade of four TPS-75/MCE prototypes to include expert missile tracker and sensor data correlator to provide robust contingency capability in the MCE; supporting active defense and attack operations. ($6600)
4. (U) Program to Completion:
   - (U) - This is a continuing program.

Program Element: 208060F
PE Title: Theater Missile Defense

Project Number: 1014 **Date:** February 1994
Budget Activity: 7(Operational Systems Dev)
Old Budget Activity: 4(Tactical Systems)

D. (U) WORK PERFORMED BY: Contractors include Martin Marietta, Albuquerque NM; Grumman, Melbourne FL; Boeing, Seattle WA, MITRE Corporation, Bedford MA; Aerospace Corporation, Los Angeles CA; and others to be determined.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) Technical Changes: No Change.

2. (U) Schedule Changes: Due to reduction in Systems Engineering and Integration funding by $5.3M in PE27411, analysis of FY94 studies and operational concept demonstrations will begin in FY95. The requirements process is extended.

3. (U) Cost Changes: PE64321 (Joint Tactical Fusion) was cut $2M in FY94. As a result, the $600K to accomplish an Intel Support Plan for TMD was eliminated. TMD funding was cut $5.3M in PE27411 by Congress; resulting in a lack of funding to effectively define TMD requirements for the Air Force. All other tasks in the previous descriptive summary are included within the current descriptive summary and are funded FY94 activities.

F. PROGRAM DOCUMENTATION:
- (U) Joint MNS for TMD - JROC - 064-91, 18 Nov 91
- (U) AF MNS for TMD - 004-91, approved Oct 91
- (U) Joint Pub 3 - 01.5, Doctrine for Joint Theater Missile Defense - Jan 93
- (U) AF TMD CONOPS Revision Jan 93 - signed 24 Feb 93
- (U) Milestone 0 Decision for AF MNS 004-91, TMD - Acquisition Decision Memorandum - 31 Mar 93

G. RELATED ACTIVITIES:
- (U) Program Element 0603617F (Command, Control, & Communications - C3 Applications)
- (U) Program Element 0207411F (Overseas Air Weapon Control Systems)

Program Element: 208060F
PE Title: Theater Missile Defense

Project Number: 1014 **Date:** February 1994
Budget Activity: 7(Operational Systems Dev)
Old Budget Activity: 4(Tactical Systems)

- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense. Funding for AF TMD activities in FY94 is held within the three program elements listed here. Program Element 208060F receives funding beginning in FY95.
- (U) JPD to be determined at Milestone 1.

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

I. (U) INTERNATIONAL COOPERATION AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

1. (U) Completed Milestone 0 - AF MNS 004-91 TMD - Mar 93
2. (U) Milestone 1 - estimated Aug 96

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0303110F
PE Title: Defense Satellite Communications System (DSCS)
Project Number: 2638
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 5 - Intelligence & Communications
Date: February 1994

A: (U) RESOURCES ($ in thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
DSCS								
12,901	20,406	30,876	34,461	22,467	16,464	15,681	27,700	666,921

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: DSCS provides Super High Frequency (SHF) satellite communications for secure voice and high data rate transmissions. It provides unique and vital national security communications for worldwide military command and control, crisis management, relay of intelligence and early warning data, treaty monitoring and surveillance information, and diplomatic traffic. DSCS supports the National Command Authorities, Worldwide Military Command and Control System, Diplomatic Telecommunications Service, White House Communications Agency, and ground mobile forces of all services. This program element performs the "Operational Systems Development" category of research because the satellites are in production. The satellites are delivered and in storage waiting launch, and operational turnover.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   (U) - Incorporated Engineering Change Proposals on DSCS III satellites ($4,701)
   (U) - Supported Future MILSATCOM Architecture Planning efforts ($4,960)
   (U) - Mission support/on-orbit performance incentives for development satellite ($3,240)

2. (U) FY 1994 Planned Program:
   (U) - Continue incorporation of Engineering Change Proposals (ECP) on DSCS III satellites ($5,567)
   (U) - Upgrade DSCS III Telemetry Gathering and Archiving System ($5,564)
   (U) - Continue Future MILSATCOM Architecture Planning efforts ($5,511)
   (U) - Mission support/on-orbit performance incentives for development satellite ($3,764)

3. (U) FY 1995 Planned Program:
   (U) - Initiate Beam Forming Network Modification development effort to DSCS III satellites ($16, 546)
   -- BFN engineering model fabrication/test; Preliminary Design Review

Program Element: 0303110F
PE Title: Defense Satellite Communications System (DSCS)
Project Number: 2638
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 5 - Intelligence & Communications
Date: February 1994

(U) - Continue incorporation of ECPs on DSCS III satellites ($5,087)
(U) - Continue Future MILSATCOM Architecture Planning efforts ($5,063)
(U) - Mission support/on-orbit performance incentives for development satellites ($4,180)

4. (U) Program to Completion: ($116,793)
   (U) - This is a continuing program
   (U) - Complete BFN modification program (Complete RDT&E - FY97)
   (U) - Complete Future MILSATCOM Architecture Planning efforts (Complete - FY96)
   (U) - Continue mission support/on-orbit performance incentives for development satellites

D. (U) WORK PERFORMED BY: The DSCS space segment is managed by Air Force Space and Missile Systems Center (SMC) in Los Angeles, CA under the direction of the Air Force Program Executive Officer for Space. Martin Marietta, Valley Forge, PA is the prime contractor for the DSCS III satellite. The Aerospace Corporation, El Segundo, CA provides systems engineering and integration to the Satellite Communications (SATCOM) Program Office, Los Angeles AFB, CA. Technology contracts with: EMS, Norcross, GA; SAIC, Vienna, VA; STEL, Reston, VA; Syracuse Research Center, Syracuse, NY; Loral, Palo Alto, CA; COMSAT Lab, Clarksburg, MD.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The Air Force has implemented user requirements for Beam Forming Network (BFN) enhancements on the last four DSCS IIIB satellites. BFNs form the DSCS IIIB multi-beam antenna patterns. The current configuration consists of one receive and two transmit beams. With this modification, four transmit and four receive beams will be made available to users. This will provide better anti-jam characteristics, and improve performance for smaller, disadvantaged terminals (tactical users).
2. (U) SCHEDULE CHANGES: Due to launch failures of the commercial Atlas-II/IABS launch vehicles, the Air Force delayed both of the planned FY93 launches. After analyzing the launch failures, the Air Force successfully launched satellites in Jul 93 and Nov 93. The next DSCS launch is currently scheduled no earlier than May 95.
3. (U) COST CHANGES: Additional funding in FY95-03 for new program content associated with Beam Forming Network enhancements. Costs previously included in PE 0303110F for acquisition of the DSCS Replenishment system have been removed. These costs have been shifted into a new PE for DSCS-R, PE 0603433F (program start FY96).

Program Element: 0303110F
PE Title: Defense Satellite Communications System (DSCS)

Project Number: 2638 Date: February 1994
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 5 - Intelligence & Communications

F. (U) PROGRAM DOCUMENTATION:
(U) - DSCS Acquisition Program Baseline, 11 Jun 1989.

G. (U) RELATED ACTIVITIES:
(U) - Defense Information Systems Agency (DISA) is the system manager and responsible system engineering.
(U) - Program Element 0603433F, DSCS Replenishment.
(U) - Program Element 0303124A, DSCS, Army procurement of ground terminals.
(U) - Program Element 0303605F, Satellite Terminals
(U) - Program Element 0303109N, Satellite Communications System.
(U) - Program Element 0305119F, Medium Launch Vehicles
(U) - Program Element 0603430F, Advanced MILSATCOM
(U) - Program Element 0603790D, Nunn Funds - used for INMILSAT studies
(U) - JPD to be determined at Milestone 0, FY96 (DSCS-R)
(U) - There is no unnecessary duplication of effort within Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3020, Missile Procurement, Budget Activity 5, Other Support, Program Title Defense Satellite Communications System								
20,087	25,930	20,185	21,274	51,558	70,785	66,676	2,403,983	3,916,720

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS:
1. (U) Signed Memorandum of Understanding (MOU) between US and United Kingdom on "Shared Use of DSCS Satellites by UK SKYNET Earth Terminals through January 1991, " revised 4 January 1990. Similar MOU with Iceland, 26 August 1990.
2. (U) Signed MOU between US, UK and France on "Concerning Cooperation on a Feasibility Study for an International Military Satellite for Communications (INMILSAT)," TBD January 94.

Program Element: 0303110F
PE Title: Defense Satellite Communications System (DSCS)

Project Number: 2638
Budget Activity: 7 - Operational Systems Dev
Old Budget Activity: 5 - Intelligence & Communications

Date: February 1994

J. (U) MILESTONE SCHEDULE:

1. (U) Satellite Launches

DSCS III/Atlas II Flight #5	FY 1995
Flight #6	FY 1998
Flight #7	FY 1999
Flight #8	FY 2000
Flight #9	FY 2002
Flight #10	FY 2003

2. (U) BFN Modifications

Procure Unit #1	FY 1997
Procure Units #2 & #3	FY 1998
Procure Unit #4	FY 1999
Installation on Satellite B-6	FY 1998
Installation on Satellite B-8	FY 1999
Installation on Satellite B-11	FY 2001
Installation on Satellite B-13	FY 2002

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0303131F **Date: February 1994**
PE Title: Minimum Essential Emergency Communications Network (MEECN)
Budget Activity: # 7 - Operational Systems Development
Old Budget Activity: # 3 - Strategic Programs

A. (U) RESOURCES ($ In Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
672834 Dual Frequency MEECN Receiver (DFMR)								
846	466	280	0	0	0	0	0	1,592
672832 Very Low Frequency/Low Frequency (VLF/LF) Improvements								
11,799	3,494	40,515	27,667	7,011	1,970	2,015	Cont	TBD
Total								
12,645	3,960	40,795	27,667	7,011	1,970	2,015	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This is the Air Force portion of the Chairman, Joint Chiefs of Staff's (JCS) program to ensure that the National Command Authority's (NCA) decision to execute or terminate actions of our nuclear capable forces can be accomplished in a precise and timely manner. MEECN communications systems are specifically designed to provide assured communications connectivity in stressed environments. MEECN includes the Dual Frequency MEECN Receiver (DFMR), the High Power Transmit Set (HPTS), and the High Data Rate (HIDAR) transmission mode programs. Amendment 160 of the DoD Appropriations Act for FY 94 prohibits construction of Ground Wave Emergency Network (GWEN) sites in FY 94. As a result the GWEN program was terminated. DFMR will provide a protected strategic communications link to Minuteman III launch control centers and bomber dispersal bases for receipt of emergency action messages on both GWEN and JCS VLF/LF frequencies. HPTS is a joint Air Force/Navy program to provide the E-4 NEACP and the E-6 TACAMO aircraft with an improved and supportable emergency

Program Element: #0303131F **Date: February 1994**
PE Title: Minimum Essential Emergency Communications Network (MEECN)
Budget Activity: # 7 - Operational Systems Development
Old Budget Activity: # 3 - Strategic Programs

action message transmission capability. High Data Rate (HIDAR) is a JCS-directed effort to provide a fast and interoperable MEECN mode. This program will develop and test modifications required to retrofit current MEECN platforms with the HIDAR transmission mode. These efforts are in the research category of operational systems development because Dual Frequency MEECN Receiver (DFMR) and High Power Transmit Set (HPTS) are nearing production decisions at the end of FY94.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 672834, Dual Frequency MEECN Receiver: The DFMR will provide US forces at ICBM launch control centers (LCCs) and operating and dispersal bases with the capability to simultaneously receive and process messages using Ground Wave Emergency Network (GWEN) and JCS Very Low Frequency/Low Frequency (VLF/LF) formats and frequencies. The enhanced capabilities provided by DFMR for dispersal operations include: 1) timely, secure, electromagnetic pulse (EMP)-survivable, jam-resistant reception of command and control communications from NCA, JCS, and US STRATCOM; 2) reception across the VLF/LF frequency band independent of transmitter type; 3) simultaneous reception and processing of transmissions from both airborne and ground transmitters using message formats and frequencies designated for the JCS VLF/LF and GWEN LF networks; 4) automatic frequency scanning and message piecing; and 5) transportability and emergency power.

(U) FY 1993 Accomplishments:
- (U) - Completed DFMR nuclear shock hardened qualifications for DFMR in LCCs. ($400)
- (U) - Initiated DFMR developmental test and evaluation (DT&E). ($168)
- (U) - Completed preparations for construction of GWEN network expansion sites. ($278)
- (U) - Resumed GWEN construction after Congressional notification.

(U) FY 1994 Plans:
- (U) - Complete DFMR DT&E and initial operational test and evaluation. ($266)
- (U) - Complete DFMR functional and physical configuration audits. ($200)
- (U) - Production decision for DFMR program.
- (U) - Terminate GWEN construction.
- (U) - Review and assess GWEN network connectivity.

Program Element: #0303131F
PE Title: Minimum Essential Emergency Communications Network (MEECN)
Budget Activity: # 7 - Operational Systems Development
Old Budget Activity: # 3 - Strategic Programs

Date: February 1994

(U) FY 1995 Plans:
(U) - Complete residual Dual Frequency MEECN Receiver (DFMR) engineering and manufacturing development tasks. ($280)

(U) Work Performed By: Air Force Materiel Command, Electronic Systems Center has managerial responsibility for Air Force MEECN programs. The prime contractor for DFMR is Westinghouse Electric, Baltimore, MD.

(U) Related Activities:
(U) - Program Element 11213F, (Minuteman Squadrons).
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Approp 3020, BA 03, Minuteman II/III Modifications								
25,700	25,200	12,000	23,400	3,700	1,300	0	0	92,800

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0303131F
PE Title: Minimum Essential Emergency Communications Network (MEECN)
Project Number: 672832
Budget Activity: # 7 - Operational Systems Development
Old Budget Activity: # 3 - Strategic Programs
Date: February 1994

A: (U) RESOURCES ($ In Thousands):

FY93 Actual	FY94 Estimate	FY9- Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Very Low Frequency/Low Frequency (VLF/LF) Improvements								
11,799	3,494	40,515	27,667	7,011	1,970	2,015	Cont	TBD

B: (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: High Power Transmit Set (HPTS) is a joint Air Force/Navy program to provide the E-4 NEACP and the E-6 TACAMO aircraft with an improved and supportable emergency action message transmission capability to communicate with nuclear forces. High Data Rate (HIDAR) is a JCS-directed effort to provide a fast and interoperable MEECN mode. This program will develop and test modifications required to retrofit current MEECN platforms with HIDAR transmission mode.

C: (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Continued E-4B HPTS EMD (modification of Navy E-6 HPTS design). ($8,899)
   - (U) - Completed E-4B HPTS preliminary design review.
   - (U) - Rebaselined Advanced Very Low Frequency/Low Frequency (VLF/LF) Receiver (AVR) to include E-4B and E-6A aircraft. ($2,900)

Program Element: #0303131F
PE Title: Minimum Essential Emergency Communications Network (MEECN)
Project Number: 672832
Budget Activity: # 7 - Operational Systems Development
Old Budget Activity: # 3 - Strategic Programs
Date: February 1994

2. (U) FY 1994 Planned Program:
   (U) - Complete developmental test and evaluation for E-4B HPTS with critical design review and delivery of final drawings. ($475)
   (U) - Terminate Advanced Very Low Frequency/Low Frequency (VLF/LF) Receiver (AVR) program.
   (U) - Complete and release High Data Rate (HIDAR) RFP, and award HIDAR development contract. ($3,019)

3. (U) FY 1995 Planned Program:
   (U) - Complete HIDAR-Airborne receiver transportability/compatibility assessment. ($19,100)
   (U) - Emergency War Order (EWO) Classroom Procedures trainer. ($3,000)
   (U) - High fidelity trainer for Dual Frequency MEECN Receiver (DFMR). ($18,415)
   (U) - Production decision for E-4B High Power Transmit Set (HPTS).

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

D. (U) WORK PERFORMED BY: Air Force Materiel Command, Electronic Systems Center has managerial responsibility for Air Force MEECN programs. Primary responsibility for the joint-service HPTS program is with the Navy's Naval Airborne Strategic Communications Program Office, PMA-271, Arlington, VA. The prime contractor for HPTS is Rockwell International, Richardson, TX.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The DoD Appropriations Act for FY 94 deleted funding for the Advanced Very Low Frequency/Low Frequency (VLF/LF) Receiver (AVR), and as a result the program was terminated.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.

Program Element: #0303131F
PE Title: Minimum Essential Emergency Communications Network (MEECN)
Project Number: 672832
Budget Activity: # 7 - Operational Systems Development
Old Budget Activity: # 3 - Strategic Programs
Date: February 1994

F. (U) PROGRAM DOCUMENTATION:
- (U) - SAC ROC 7-71, 22 Apr 71.
- (U) - MROC 2-80, 3 Feb 83.
- (U) - MROC 18-83, 31 Aug 83.
- (U) - OSD Rpt, Strategic Command, Control, and Communications Review Report, 1 Aug 91.
- (U) - JCSM-156-91, Minimum Essential Emergency Communications Network Modes, 30 Aug 91.

G. (U) RELATED ACTIVITIES:
- (U) Program Element #32015F, E-4 Modifications.
- (U) High Power Transmit Set (HPTS) is a joint service program with the Navy as lead. The program is governed by a joint Memorandum of Agreement (MOA) maintained at the Secretary of the Air Force/Navy level.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ In Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Aircraft Procurement, BA 5, E-4B Class V Mods								
0	0	21,400	28,800	1,000	900	900	0	53,000

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

Program Element: #0303131F
PE Title: Minimum Essential Emergency Communications Network (MEECN)

Project Number: 672832
Budget Activity: # 7 - Operational Systems Development
Old Budget Activity: # 3 - Strategic Programs

Date: February 1994

J. (U) MILESTONE SCHEDULE:

High Power Transmit Set (HPTS)

1.	(U) E-4B engineering and manufacturing development contract start. (Mod E-6 Design)	Aug 92
2.	(U) E-4B preliminary design review.	Feb 93
3.	(U) E-4B critical design review.	Jan 94
4.	(U) E-4B engineering and manufacturing development complete. (Drawings Delivered)	Jun 94

High Data Rate (HIDAR)

1.	(U) RFP preparation.	Jan 94
2.	(U) RFP release.	Mar 94
3.	(U) Development contract award.	Jun 94
4.	(U) Phase I prototyping begins.	Jan 95
5.	(U) Phase I critical design review.	Jun 95
6.	(U) Phase II prototyping begins.	Jun 95
7.	(U) Phase II critical design review.	Dec 95
8.	(U) Phase I prototyping complete.	Mar 96
9.	(U) Phase I testing begins.	Apr 96
10.	(U) Phase II prototyping complete.	Jun 96
11.	(U) Phase I testing completes.	Jul 96
12.	(U) Phase II testing begins.	Jul 96
13.	(U) Phase II testing completes.	Sep 96

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0303140F
PE Title: Information Systems Security (INFOSEC)
Project Number: 7820
Budget Activity : # 7 Operational Systems Support
Old Budget Activity: #5 Intelligence & Comm
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Communications-Computer Security (C-CS) RDT&E: FIRESTARTER								
13,485*	16,691	10,293	17,326	15,431	16,278	17,013	Cont	TBD

* FY 93 funding contained in PE 0303401F, Communications Security

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program element (PE) addresses problems encountered in adapting general purpose cryptographic equipment and multilevel computer security technology for use in new Air Force communications and computer systems. The Air Force does not have mechanisms that allow the implementation of tamper proof guarantees against professional and amateur intruders from either inside or outside the system. This program directs Command, Control, Communications, Computer, and Intelligence (C4I) system security R&D and defines and evaluates alternative concepts and/or products which can provide the security services required to reduce the risk of hostile technological exploitation of Air Force systems. It also develops secure voice systems, communications security (COMSEC) devices and systems that prevent unintentional emanations (TEMPEST). This program is in research category 6.5, Engineering and Manufacturing Development, because efforts are aimed at evaluating and then improving and/or protecting existing communication-computer systems. All initiatives are part of the Department of Defense (DoD) INFOSEC program and insure that Air Force systems currently being developed meet national communications and computer security requirements and standards.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   (U) - WWMCCS-CAT guard accredited and operational at AMC. ($0.450)

Program Element: #0303140F
PE Title: Information Systems Security (INFOSEC)
Project Number: 7820
Budget Activity : #7 Operational Systems Support
Old Budget Activity: #5 Intelligence and Comm
Date: February 1994

(U) - Completed development of a secure electronic mail system at STRATCOM. ($0.600)
(U) - Transitioned trusted laptop computer, secure database management system and formal methods/security policy modeling tools from Rome Labs (RL) to Electronic Systems Center (ESC). ($0.550)
(U) - SEAVIEW secure relational database management system ported and demonstrated on Sun CMW workstation platform. ($1.800)
(U) - Developed and demonstrated a prototype intrusion-detection system to monitor a network of trusted computer systems. ($0.900)
(U) - Completed development of a prototype stand alone B2 trusted database management system for the Air Force Standard small computer and began design of a client-server architecture. ($1.600)
(U) - Initiated the development of a testbed which demonstrates the CYPRIS technology and its application to tactical voice/data communications within the Speakeasy program. ($1.850)
(U) - Demonstrated the Computer Aided Analysis System (CAAS) to NSA, AFIWC and US Navy and transferred prototype system for initial training and user feedback. ($0.800)
(U) - Completed a real-time narrowband conferencing demonstration system. ($1.000)
(U) - Licensed Multi-speaker Conferencing technology to Digital Voice Systems Inc. of Burlington MA. ($0.250)
(U) - Multi Band Excitation (MBE) speech compression technology selected as Land Mobile Radio Standard for the Association of Public-Safety Officers and as Federal Land Mobile Radio Standard. (Not separately priced)
(U) - Transitioned 2.4 Kbps Sinusoidal Transform Coder speech compression technology to the F-22 program for use in their avionics suite. Future interest includes narrowband multi-speaker conferencing. ($0.600)
(U) - Secure voice proposals adopted in the Future Secure Voice Goal Architecture being developed by the DoD Digital Voice Processor Consortium under tasking from the Joint Chiefs in support of the "C4I For The Warrior Program." ($0.150)
(U) - Demonstrated Secure Database Management prototype, Compartmented Mode Workstation, Secure Guards, etc. to operational users as part of technology transition. ($1.000)
(U) - Developed signal processing systems to provide enhanced sensitivity and classification capability for Tempest receivers. ($1.200)
(U) - Established tri-service testbed for evaluation and transition of security prototypes. ($0.500)
(U) - Initiated design effort to transition the WWMCCS-CAT guard for use by CENTCOM. ($0.235)

Program Element: #0303140F
PE Title: Information Systems Security (INFOSEC)
Project Number: 7820
Budget Activity : #7 Operational Systems Support
Old Budget Activity: #5 Intelligence and Comm
Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) - Continue experiment in secure distributed computing; establish MLS processing clusters at RL, CECOM and NRaD and begin secure wide-area network (WAN) experiment design. ($0.565)
   - (U) - Complete development of a secure database management capability. ($0.750)
   - (U) - Complete development of a formal model of a trusted object-oriented database management system. ($0.460)
   - (U) - Complete development of high-assurance tools for verification and certification. ($0.630)
   - (U) - Complete the development of a client-server B2 trusted database management system for the AF standard small computer and begin design of a prototype counter-narcotics test application. ($0.600)
   - (U) - Complete development of a STU-III multi-speaker conferencing applique. ($1.220)
   - (U) - Development of secure distributed computing systems prototypes. ($1.275)
   - (U) - Prototype development of the generative guard for application portability. ($1.181)
   - (U) - Advanced secure speech processing techniques. ($1.100)
   - (U) - Computer aided signal analysis technique and prototype development. ($2.600)
   - (U) - Security prototype transition to user environments. ($2.750)
   - (U) - Complete the development of the Comfy Ash analysis capability. ($0.560)
   - (U) - Advanced programmable cryptography capability. ($1.500)
   - (U) - Development of trusted RUBIX distributed computing capability ($1.500)

3. (U) FY 1995 Planned Program:
   - (U) - Implement a prototype counter-narcotics demonstration using the B2 trusted database management system based on the design developed in FY94. ($1.800)
   - (U) - Continue joint evaluation and secure distributed computing experiments with Army/Navy/Air Force and ESC; implement secure WAN capability. ($0.800)
   - (U) - Complete upgrade of Baseband Processor to enhance TEMPEST signal detection and collection capability. ($0.500)
   - (U) - Continue development of CAAS TEMPEST Signal Analysis System to include vibrational energy retrieval module and video breakback module. ($0.500)
   - (U) - Complete prototype of highly-configurable guard which can readily be ported/tailored to a multitude of target user environments and applications. ($0.750)
   - (U) - Security prototype transition to user environments. ($2.000)

Program Element: #0303140F
PE Title: Information Systems Security (INFOSEC)
Project Number: 7820
Budget Activity : #7 Operational Systems Support
Old Budget Activity: #5 Intelligence and Comm
Date: February 1994

(U) - Development and application of secure distributed computing system technology. ($1.943)
(U) - Continue development and transition of secure voice capability. ($1.000)
(U) - Prototype development of secure object oriented distributed database management system. ($1.000)

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

D. (U) WORK PERFORMED BY: There are multiple contractors working on technology development efforts within this PE, all managed through the Rome Laboratory, Griffiss AFB NY and Electronic Systems Center (ESC) in Hanscom AFB MA. The top five contractors are: Harris Corp, Melbourne FL; Watkins Johnson Corp., Gaithersburg MD; Odessey Research Associates, Ithaca NY; Arcon Corp, Waltham MA; Summaris Corp, Waltham MA. There are an additional 15 contractors working on various parts of the program.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: A one year delay in electromagnetic remanence detection development and a one year delay in the NONSTOP receiver and enhanced baseband processor TEMPEST development efforts. Addition of trusted RUBIX development effort.
3. (U) COST CHANGES: The schedule changes are not expected to result in additional development costs to the Air Force.

EXPLANATION:
1. (U) Technical: None.
2. (U) Schedule: Delay in NONSTOP receiver and enhanced baseband processor development caused by FY94 POM $2.0M funding reduction. Addition of trusted RUBIX development effort Congressionally directed.
3. (U) Cost: None.

Program Element: #0303140F **Project Number:** 7820 **Date:** February 1994
PE Title: Information Systems Security (INFOSEC) **Budget Activity :** #7 Operational Systems Support
Old Budget Activity: #5 Intelligence and Comm

F. PROGRAM DOCUMENTATION:

- TAF SON 738-88C1, Multilevel Security for C3I Systems (U).
- ESC SON 013-89C1, COMFY ASH (S-NF-W).
- SAC SON 000-89C1, Secure Database System (S-NF-W).
- SAC SON 000-89C1, Secure Management of Aggregation of Data (S-NF-W).
- SAC SON 000-89C1, Classified Material Control System (S-NF-W).
- AFMPC SON 000-089C1, Personnel Records Security System (S-NF-W).
- ESC SON 008-89C1, Advanced NONSTOP Test Set (S-NF-W).
- ESC SON 012-89C1, Computer Assisted Signal Analysis Technology Program (S-NF-W).
- ESC SON 009-89C1, Broadband Time Domain Signal Collection System (S-NF-W).
- ESC SON 011-89C1, Wideband Recorder/Player (S-NF-W).
- ESC SON 010-89C1, SHF/EHF Test System (S-NF-W).
- AFSPACECOM (pending), Handheld Secure Radios (U).
- AFWL (pending), High Speed Key Generation Devices (U).
- ESC SON 002-90, Acoustic Energy Retrieval/Measurement System (S-NF-W).
- AFSPACECOM SON 000-90, Secure Hand-Held Cellular Telephone (S-NF-W).
- ESC SON 001-90, Advanced Demodulator (S-NF-W).
- AFSC SON 000-89, High-Speed Crypto Generator (S-NF-W).
- AFLC SON 002-90, Network Security System (NSS) (U).
- ESC SORD 838-88-I, MLS for MAC Command and Control Automated Systems, MLS Information Flow Control Subsystem for AFLC Automated Information Systems, and MLS for ESC Intelligence Data Handling Systems (U).
- ESC SORD 000-00-I, MLS for TAF Unit Level Theater Battle Management System and MLS for the Air Force Flight Test Center (AFFTC) (U).

Program Element: #0303140F
PE Title: Information Systems Security (INFOSEC)
Project Number: 7820
Date: February 1994
Budget Activity : #7 Operational Systems Support
Old Budget Activity: #5 Intelligence and Comm

G. RELATED ACTIVITIES:

- (U) The research and development efforts pursued under PE 33140F are complementary to work being performed under NSA PE 35167G which is addressing the development of generic technology in the area of Information Security.
- (U) Products from PE33140F transition to other agencies through PE 64740F Computer Resource Management Technology Transition.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0303144F **Date: February 18, 1994**
PE Title: Electromagnetic Compatibility Analysis Center (ECAC)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence & Communications

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
0001	Electromagnetic Compatibility Analysis Center (ECAC)							
9,733	9,922	9,287	9,729	9,773	10,109	10,471	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: ECAC is a Joint DOD Center operating IAW with DOD Directive 3222.3. Policy and program direction are provided jointly by the Chairman, Joint Chiefs of Staff (JCS), and the Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (OASD/C3I). The Air Force is designated as the administrative agent for ECAC with the responsibility to program, budget, and finance the Joint Program. ECAC provides electromagnetic compatibility (EMC) analysis support to OASD, JCS, operational commands, and the military departments. OASD/JCS directed projects for which the Center is responsible include the Frequency Resource Record System (FRRS), Joint Spectrum Management System (JSMS) {JSMS was directed to start in FY92}, Joint Spectrum Interference Resolution (JSIR) {JSIR was directed to start in FY93}, Operational Planning, EMC Analytical Model and Database Development, and Communications-Electronics (C-E) Systems Acquisition EMC guidance. The FRRS, JSMS, JSIR, and Operational Planning projects are managed by JCS and provide combat force multiplying capabilities directly to operational components by ensuring optimum use of the spectrum to support weapon system combat

Date: February 1994

Program Element: #0303144F
PE Title: Electromagnetic Compatibility Analysis Center (ECAC)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence & Communications

effectiveness. ECAC's Analytical Models and Databases are used to support the above JCS managed projects and the DoD acquisition community. This support reduces systems life cycle costs, minimizes schedule deviations, and ensures systems operate effectively in a warfighting electromagnetic environment. ECAC's mission also includes support to the U.S. Military Communications-Electronics Board (MCEB) in developing policy and guidance for the development, procurement, deployment, and operation of C-E systems. Even though the activities on this program element cross research categories/budget activities, the work supports operations systems which is why the PE is categorized as operational systems development.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10M IN FY 1995:

(U) 0001, Electromagnetic Compatibility Analysis Center (ECAC): Project is the Joint DoD EMC Program and provides EMC modeling, analysis, database support to the OSD, JCS, operational and acquisition communities, and other agencies and organization in the DoD. Mission includes development of engineering analysis methodology, techniques and policy consultation to ensure C-E systems are designed, developed, procured, and operated in the most effective manner to optimize weapon systems performance in all warfighting scenarios.

(U) FY 1993 Accomplishments: $9,733K

(U) - Completed 1st phase, coding and testing, of the consolidated maintenance center development of the Equipment Characteristics Information Database (ECIDB). $200K

(U) - Measured the electromagnetic interference (EMI) susceptibility levels of selected electro-optic sensors. $IOOK

(U) - Developed enhancements to the Joint Spectrum Management System (JSMS) to include: network access, simultaneous multi-user access, database spawning, and more efficient database retrieval and load algorithms. $200K

Program Element: #0303144F **Date: February 18, 1994**
PE Title: Electromagnetic Compatibility Analysis Center (ECAC)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence & Communications

(U) - Completed open system architecture design of an Integrated FRRS/JSMS spectrum management system; began development of a Graphical User Interface (GUI) prototype. $900K
(U) - Incorporated expert system edit-check and error trapping capability to FRRS. $100K
(U) - Continued development of database and electromagnetic compatibility/vulnerability (EMC/V) capabilities: completed Tactical Database (TACDB) status resource and training system (SORTS) map; completed TACDB maintenance system; completed Government Master File (GMF) database migration software. $1,500K
(U) - Developed methodology to predict the effects of EMI on passive electronic warfare systems. $200K
(U) - Began development of an aircraft EMI model interface with standard electronic aircraft geometry data files to produce a graphical display of the results for analysis. $100K
(U) - Developed analytic techniques for EMI predictions on aircraft with radar absorbing material. $500K
(U) - Completed preliminary design of the enhanced Tactical Environment Generator (TEGEN) on UNIX-based workstation, began development migration of TEGEN capability to the workstation environment. $200K
(U) - Upgraded automated Space System EMI analysis model. $1,000K
(U) - Completed the system requirements and specification, hardware architecture, and external user support documentation for ECAC's EMC Analysis System (EAS). $500K
(U) - Reviewed and provided EMC evaluations to the MCEB on Service requests for equipment frequency allocation for approximately 100 C-E systems in various stages of development and deployment. $600K
(U) - Completed Strategic Spectrum Management Plan for OASD/C3I to intelligently develop plans to share DoD frequency spectrum with the private sector. $100K
(U) - Incorporate prediction of EMI effects into a standard battlefield simulation model. $700K
(U) - Provided management support function associated with government technical and administrative management of ECAC (RDT&E funded by Air Force directive). $2,833K

Program Element: #0303144F **Date: February 18, 1994**
PE Title: Electromagnetic Compatibility Analysis Center (ECAC)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence & Communications

(U) FY 1994 Plans: $9,922K

(U) - Complete development of next-generation, large-scale EMI analysis model for space and terrestrial systems. $500K
(U) - Continue migration of TEGEN capability to workstation environment. $200K
(U) - Begin development of DoD EMC database external query access for the warfighter. $300K
(U) - Complete initial operational capability (IOC) of spectrum certification information system. $200K
(U) - Implement methodology to predict the effects of EMI on passive electronic warfare systems. $200K
(U) - Continue development of an aircraft EMI model interface with standard electronic aircraft geometry data files and produce graphical display of model results. $200K
(U) - Begin development of cosite analysis capability to analyze high power effects. $1,000K
(U) - Continue integration of JSMS/FRRS capabilities into one system utilizing one Graphical User Interface (GUI). $400K
(U) - Incorporate prediction of EMI effects into a standard battlefield simulation model. $600K
(U) - Develop techniques to predict EMI effects of ultra-wide-band (UWB) and ultra high resolution radars (UHRR). $100K
(U) - Review and provide EMC evaluations to the MCEB on Service requests for Equipment Frequency Allocation for approximately 100 C-E systems in various stages of development and deployment. $600K
(U) - Develop models for predicting EMI effects related to transmitter/receiver (T/R) modules. $100K
(U) - Continue development and migration of ECAC's EAS capabilities (models and database). $2,000K
(U) - Continued to develop and populate the spectrum use database to assist OASD/C3I in evaluating the impact of DoD spectrum use. $100K
(U) - Continue the development of the ECIDB consolidated maintenance center. $100K

Program Element: #0303144F
PE Title: Electromagnetic Compatibility Analysis Center (ECAC)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence & Communications

Date: February 18, 1994

(U) - Provide management support function associated with government technical and administrative management of ECAC (RDT&E funded by Air Force directive). $3,322K

(U) FY 1995 Plans: $9,287

(U) - Continue development of models for predicting EMI effects related to T/R modules. $100K
(U) - Incorporate techniques for predicting EMI effects of UHRR radars into standard EMC analysis capabilities. $100K
(U) - Continue development and population of the spectrum use database to assist OASD/C3I in evaluating the impact of DoD spectrum use. $100K
(U) - Prototype DoD EMC database external query capability complete. $300K
(U) - Implement GUI for the Integrated JSMS/FRRS system. $400K
(U) - Incorporate prediction of EMI effects within distributed and real time battlefield simulation models. $800K
(U) - Complete an aircraft EMI model interface with standard electronic aircraft geometry data files and produce graphical displays of model results. $200K
(U) - Complete development of cosite analysis capability to analyze high power effects. $700K
(U) - Review and provide EMC evaluations to the MCEB on service requests for Equipment Frequency Allocation for approximately 100 C-E systems in various stages of development and deployment. $700K
(U) - Complete migration of TEGEN capabilities. $300K
(U) - Complete initial operational capability of the ECIDB consolidated maintenance center. $100K
(U) - Continue development/migration of ECAC EAS (models and database) capabilities to object oriented architecture. $2,100

Program Element: #0303144F **Date: February 18, 1994**
PE Title: Electromagnetic Compatibility Analysis Center (ECAC)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence & Communications

(U) - Provide management support function associated with government technical and administrative management of ECAC (RDT&E funded by Air Force directive). $3,387K

(U) Work Performed By: The IIT Research Institute at Annapolis, MD, under contract through the Electronic Systems Center (ESC), Hq Air Force Material Command (AFMC). Contractual effort is managed by ECAC technical staff.

(U) Related Activities: None.

(U) Other Appropriation Funds ($ in thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	TO Complete	TOTAL Program
Appropriation O&M, Budget Activity #5, Program Title ECAC								
6,645	6,192	5,927	5,427	5,060	5,233	5,406	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0303601F
PE Title: Milstar (AF Terminals)
Project Number: 2487
Budget Activity: 7 - Operational Systems Development
Old Budget Activity: 3 - Advanced Development
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Milstar Terminals								
139,639*	76,878	18,249	45,829	17,507	17,611	16,634	125,048	2,105,605

* The FY93 and FY94 budgets represent the portion of the 33601 budget allocated for Milstar Terminals. For an explanation of how the other funds are being spent see the Descriptive Summaries for PE 0604479 (Milstar Low Date Rate/Medium Data Rate Satellites) and PE 0603432F (Polar Adjunct).

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
Milstar is a joint service program to develop and acquire extremely high frequency (EHF) satellites, satellite mission control segment, and new or modified communication terminals for survivable, jam-resistant, worldwide, secure communications for the strategic and tactical warfighter up through the early stages of nuclear war. This portion of the program develops Air Force ground and airborne terminals used to communicate through Milstar.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Develop terminals, upgrades, and modifications ($77.022M)
     - (U) - Develop terminals (B-Kit) for E-4B
     - (U) - Milstar Command Post Terminal (CPT) hardware and software upgrades
     - (U) - Air Force Satellite Communications (AFSATCOM) modifications
     - (U) - Continue technical and management support services
   - (U) Develop terminal equipment ($34.909M)
     - (U) - Develop installation kits (A-Kit) for E-4B
     - (U) - Develop E-4 Triband Radome
     - (U) - Develop Milstar Air Force Terminal Remoting System (MAFTRS)
     - (U) - Develop Antenna Pedestal Assembly Test Station (APATS)
   - (U) Support other development activities ($27.708M)
     - (U) - Develop Low Cost Terminal (LCT) technology
     - (U) - Support testing activities
     - (U) - Conduct program studies and trades

Program Element: 0303601F
PE Title: Milstar (AF Terminals)

Project Number: 2487 Date: February 1994
Budget Activity: 7 - Operational Systems Development
Old Budget Activity: 3 - Advanced Development

2. (U) FY 1994 Planned Program:
   (U) Develop terminals, upgrades, and modifications ($53.488M)
      (U) - Develop terminals (B-Kit) for E-4B
      (U) - Milstar Command Post Terminal (CPT) hardware and software upgrades
      (U) - Air Force Satellite Communications (AFSATCOM) modifications
      (U) - Continue technical and management support services
   (U) Develop terminal equipment ($20.694M)
      (U) - Develop installation kits (A-Kit) for E-4B
      (U) - Develop E-4 Triband Radome
      (U) - Develop Mobile Ground Systems Baseboard Interface Units (MGS BBIU)
   (U) Support other development activities ($2.696M)
      (U) - Support testing activities
      (U) - Conduct program studies and trades

3. (U) FY 1995 Planned Program:
   (U) Develop terminals, upgrades, and modifications ($15.249M)
      (U) - Air Force Satellite Communications (AFSATCOM) modifications
      (U) - Continue technical and management support for residual Command Post development activities
   (U) Support other development activities ($3.000M)
      (U) - Support testing activities
      (U) - Conduct program studies and trades

4. (U) Program to Completion:
   (U) Develop terminals, upgrades, and modifications
      (U) - Air Force Satellite Communications (AFSATCOM) modifications
      (U) - Continue technical and management support services

D. (U) WORK PERFORMED BY: Development of the Milstar space, mission control, and AF terminal segments is managed by a program office located at AF Materiel Command's Space and Missile Systems Center Los Angeles AFB, CA under the direction of the AF Program Executive Officer (PEO) for Space. Milstar terminals are developed by Raytheon Company, Sudbury, MA and Rockwell International, Dallas, TX. Systems Engineering and technical support is provided by the MITRE Corporation, Bedford, MA; and Lincoln Laboratory, Bedford, MA.

Program Element: 0303601F
PE Title: Milstar (AF Terminals)

Project Number: 2487
Budget Activity: 7 - Operational Systems Development
Old Budget Activity: 3 - Advanced Development

Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: This PE reflects the ground portion of the Milstar system. New PEs have been created for other portions of the system.

F. PROGRAM DOCUMENTATION:

- (U) Milstar Operational Requirements Document (ORD), 4 Sep 92.
- (U) Milstar Test and Evaluation Master Plan (TEMP), 25 Aug 92.
- (U) Milstar Acquisition Decision Memorandum, 28 Oct 92.

G. (U) RELATED ACTIVITIES:

- (U) PE 0604479F, Low Data Rate/Medium Data Rate Milstar
- (U) PE 0603432F, Polar Adjunct
- (U) PE 0603430F, Advanced Military Satellite Communications
- (U) PE 0303110F, Defense Satellite Communications System
- (U) PE 0603433F, Defense Satellite Communications System Replenishment
- (U) PE 0303606F, UHF Satellite Communications
- (U) PE 0303605F, Satellite Communication Terminals
- (U) There is no unnecessary duplication of effort within the AF or the DOD

Program Element: 0303601F
PE Title: Milstar (AF Terminals)

Project Number: 2487
Budget Activity: 7 - Operational Systems Development
Old Budget Activity: 3 - Advanced Development

Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation Aircraft Procurement, Budget Activity 5, Program Title Milstar UHF/EHF Command Post Upgrade								
15,467	0	9,300	0	0	0	0	0	186,312
Appropriation Aircraft Procurement, Budget Activity 5, Program Title Acft Initial Spares & Repairs								
1,706	957	0	0	0	0	0	0	29,895
Appropriation Other Procurement, Budget Activity 3, Program Title MILSATCOM								
36,385	34,010	3,770	26,684	58,683	40,233	3,104	97,890	765,930
Appropriation Other Procurement, Budget Activity 3, Program Title Initial Spares								
35,102	3,396	0	0	0	0	0	0	152,951
Appropriation Other Procurement, Budget Activity 4, Program Title Initial Spares								
0	0	1,828	3,053	1,572	1,934	2,790	11,417	22,594

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) MAJOR MILESTONES:

1. Initial Operational Capability for Milstar I	Sep 96
2. Initial Operational Capability for Milstar II	Apr 01
3. Organic Support Capability	Apr 98
4. Full Operational Capability	Jun 05

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program: 0303605F
Date: February 1994
PE Title: Satellite Communications Terminals
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 4-Tactical Programs

A. (U) RESOURCES ($ in Thousands)

	FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3164	Ground Mobile Forces Terminals (GMFT)								
	2,575	0	0	2,010	1,861	2,028	2,217	Cont	TBD
3594	Single Channel Transponder System (SCTS)								
	1,570	1,391	1,905	1,934	1,948	1,962	1,977	Cont	TBD
Total									
	4,145	1,391	1,905	3,944	3,809	3,990	4,194	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

This program develops military satellite communications terminals and associated modulator/demodulator (modem) equipment for use by the Air Force, and other Services. Developments currently underway address strategic and tactical deficiencies of the US Military Satellite Communications (MILSATCOM) systems. There are currently two satellite terminal projects in this program element.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 3164, Ground Mobile Forces Terminals (GMFT): The Air Force GMFT program requires a small, lightweight SHF satellite communications terminal to provide reliable, secure voice and data for highly mobile combat teams such as Forward Air Controllers, Special Operations Forces, and Combat Control Teams. This project conducted a demonstration/validation effort for lightweight SHF satellite ground terminal technology to assess the feasibility of meeting user requirements with SHF manpack units.

Program: 0303605F
Date: February 1994
PE Title: Satellite Communications Terminals
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 4-Tactical Programs

(U) FY 1993 Accomplishments: ($2,575K)
(U) - Completing the demonstration/validation program for SHF lightweight manpack terminals.

(U) FY 1994 Plans: Not Applicable.

(U) FY 1995 Plans: Not Applicable.

(U) Work Performed By: RCA of Camden, NJ. The Electronic Systems Center (ESC) of the Air Force Materiel Command (AFMC), Hanscom AFB MA manages the program for the Air Force.

(U) Related Activities:
(U) - PE 0604479F, Low Data Rate/Medium Data Rate Milstar
(U) - PE 0303601F, Milstar Terminals
(U) - PE 0603432F, Polar Adjunct
(U) - PE 0603430F, Advanced Military Satellite Communications
(U) - PE 0303110F, Defense Satellite Communications System
(U) - PE 0603433F, Defense Satellite Communications System Replenishment
(U) - PE 0303606F, UHF Satellite Communications

(U) - There is no unnecessary duplication of effort within the AF or the DOD

(U) International Cooperative Agreements: Not Applicable.

(U) Other Appropriation Funds:

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation Other Procurement, Budget Activity 3, Program Title MILSATCOM								
3,847	4,605	2,321	2,100	1,700	1,400	1,100	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

Program: 0303605F **Date:** February 1994
PE Title: Satellite Communications Terminals
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 4-Tactical Programs

2. (U) Project 3594, Single Channel Transponder System (SCTS): Note: Yearly accomplishments listed are only representative of tasks performed to maintain the space segment. Annual funding supports all efforts which are required to sustain applicable satellite systems.

(U) FY 1993 Accomplishments: ($1,570K)
(U) - Conducted GAP analysis of UHF and SHF resources on AFSATCOM SCTS, UHF Follow-on and Milstar Hosts.
(U) - Conducted studies and analysis of the Polar Host satellite system.
(U) - Performed system timing upgrades to SCTS.
(U) - Performed SCTS system on-orbit capability testing.

(U) FY 1994 Plans: ($1,391K)
(U) - Conduct GAP analysis of UHF and SHF resources on AFSATCOM SCTS, UHF Follow-on and Milstar Hosts.
(U) - Monitor Polar Host development and production.
(U) - Participate in the development and testing of SCTS operational software.

(U) FY 1995 Plans: ($1,905K)
(U) - Conduct GAP analysis of UHF and SHF resources on AFSATCOM SCTS, UHF Follow-on and Milstar.
(U) - Monitor Polar Host development and production.
(U) - Participate in the development and testing of SCTS operational software.

(U) Work Performed By: Aerospace Corporation and General Electric of Los Angeles, CA. The Space and Missile Center (SMC) of the Air Force Materiel Command (AFMC), Los Angeles AFB CA manages the program for the Air Force.

(U) Related Activities:
(U) - PE 0604479F, Low Data Rate/Medium Data Rate Milstar
(U) - PE 0303601F, Milstar Terminals
(U) - PE 0603432F, Polar Adjunct
(U) - PE 0603430F, Advanced Military Satellite Communications
(U) - PE 0303110F, Defense Satellite Communications System
(U) - PE 0603433F, Defense Satellite Communications System Replenishment
(U) - PE 0303606F, UHF Satellite Communications

Program: 0303605F **Date: February 1994**
PE Title: Satellite Communications Terminals
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 4-Tactical Programs

(U) - There is no unnecessary duplication of effort within the AF or the DOD

(U) International Cooperative Agreements: Not Applicable.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation Other Procurement, Budget Activity 3, Program Title MILSATCOM								
0	4,300	900	0	0	0	0	0	5,200

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0303606F
PE Title: AF Satellite Comm (AFSATCOM)

Project Number: 2923
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Air Force Satellite Communications (AFSATCOM)								
380*	0	20,879	34,172	26,506	10,244	8,548	43,504	166,438

* The budget for FY93 (and prior years) was funded out of PE 0303605 - Satellite Communications. It was moved to this new PE in the FY94 Presidents Budget to better reflect that its use is for UHF Satellite Communications.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: UHF Satellite Communications is a program to develop, acquire, and field Network Control Stations and UHF terminal upgrades for theater warfare use. Network Control Stations (NCS) implement Demand Assigned Multiple Access (DAMA) to automate channel allocations of 5 KHz channels and convert dedicated channels to time-shared channels. Terminal upgrades implement DAMA capability for both 5 & 25 KHz channels and also implement 5 KHz secure voice capability. This program improves joint interoperability and implements the efficiency improvements in spectrum utilization necessary to accommodate increasing user demand in the face of decreasing satellite capacity.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   (U) Develop 5 KHz NCS ($0.380M)
   (U) - Begin development of NCS for pre-qualification testing
   (U) - Begin National Security Agency (NSA) certification process
2. (U) FY 1994 Planned Program:
   (U) No RDT&E activities funded due to Congressional action.

Program Element: 0303606F
PE Title: AF Satellite Comm (AFSATCOM)

Project Number: 2923
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

3. (U) FY 1995 Planned Program:
   (U) Continue development of 5 KHz NCS ($10.800M)
      (U) - Develop user interface
      (U) - Prepare NCS for qualification testing
      (U) - Complete NSA certification process
      (U) - Begin NCS qualification testing
      (U) - Provide technical and management support services
   (U) Continue development of airborne DAMA capability ($10.079M)
      (U) - Adapt NCS modem for airborne DAMA use
      (U) - Validate 5 KHz DAMA modem in terminal mode
      (U) - Test 5 KHz DAMA modem on aircraft
      (U) - Provide technical and management support services

4. (U) Program to Completion:
   (U) Develop NCS
      (U) - Complete user interface development
      (U) - Conduct formal qualification and testing
      (U) - Provide technical and management support services
   (U) Complete development of airborne DAMA capability
      (U) - Develop installation kits for each aircraft type
      (U) - Integrate and test DAMA capability on each aircraft type
      (U) - Provide technical and management support services

D. (U) WORK PERFORMED BY: The prime contractors for the 5 KHz DAMA NCS are ViaSAT, Inc and Titan/Linkabit, Corp. The prime contractor for the airborne DAMA capability is yet to be determined. The development and acquisition of the DAMA NCSs and airborne DAMA capability are managed by the program office located at Air Force Materiel Command's Space and Missile Systems Center, Los Angeles AFB, CA under the direction of the Air Force Program Executive Office (PEO) for Space.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: One year delay to development and fielding of NCS due to Congressional action.
3. (U) COST CHANGES: None

Program Element: 0303606F
PE Title: AF Satellite Comm (AFSATCOM)

Project Number: 2923
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

F. PROGRAM DOCUMENTATION:
- (U) MJCS-63-89, UHF Satellite Communications Demand Assigned Multiple Access (DAMA) Requirement
- (U) MJCS-36-89, UHF Satellite Secure Voice Policy

G. (U) RELATED ACTIVITIES:
- (U) PE 0303605F, Satellite Communications
- (U) PE 0604479F, Low Data Rate/Medium Data Rate Milstar
- (U) PE 0303601F, Milstar Terminals
- (U) PE 0603432F, Polar Adjunct
- (U) PE 0603430F, Advanced Military Satellite Communications
- (U) PE 0303110F, Defense Satellite Communications System
- (U) PE 0603433F, Defense Satellite Communications System Replenishment
- (U) There is no unnecessary duplication of effort within the AF or the DOD

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation Aircraft Procurement, Budget Activity 5, Program Title UHF MILSATCOM/ARC-187 and UHF MILSATCOM/DAMA								
0	10,515	11,344	0	9,330	9,304	8,989	21,110	70,592
Appropriation Aircraft Procurement, Budget Activity 5, Program Title Acft Initial Spares & Repairs								
0	0	0	0	0	0	00	2,111	2,111
Appropriation Other Procurement, Budget Activity 3, Program Title MILSATCOM								
12,253	0	0	14,588	12,687	30,035	2,747	0	82,402
Appropriation Other Procurement, Budget Activity 3, Program Title Initial Spares								
1,313	0	0	0	0	0	0	0	2,424

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

Program Element: 0303606F
PE Title: AF Satellite Comm (AFSATCOM)

Project Number: 2923
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

J. (U) MILESTONE SCHEDULE:

1.	(U) Narrow band Secure Voice Terminal Compatibility Implementation	Sep 96
2.	(U) DAMA Initial Operational Capability	Sep 96
3.	(U) 5 KHz DAMA NCS deliveries	Dec 96
4.	(U) 5 KHz DAMA NCS Initial Operational Capability	Jan 97
5.	(U) Production decision for airborne DAMA capability	Feb 97
6.	(U) Deliveries of airborne DAMA capability begin	Sep 97

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305110F
PE Title: Satellite Control Network (SCN)

Project Number: 3276
Budget Activity: #7 Operational Systems Support
Old Budget Activity: #6 Defense Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY 99 Est	To Complete	Total Program
Project 3276, Air Force Satellite Control Network (SCN)								
92,653	96,095	101,146	96,482	100,957	104,650	108,783	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The AFSCN is a global network of mission control centers (Nodes), remote tracking stations (RTS), and communications links that control and communicate with the growing inventory of increasingly complex national security space vehicles. The AFSCN project funds the development, acquisitions, and engineering needed to continue the evolution of this highly reliable national satellite tracking, telemetry and commanding capability to meet the requirements of the developmental and operational satellite systems it supports.

(U) Satellite systems must have contact with ground based command & control systems to operate. The AFSCN is the DoD common user satellite control network. It supports DoD, National, Civil, and Allied satellites. The SCN is maintained, operated and improved using funding provided in three PE's. This program funds the development, acquisition, and continuing support of this highly reliable national satellite control network in support of common user satellite systems. The Network provides satellite state-of-health for common user systems such as DMSP, GPS, DSCS. It controls on-orbit spares and controls orbit changes of satellites for programs with dedicated networks. It supports these and other systems with relay of mission data back to CONUS.

Program Element: #0305110F
PE Title: Satellite Control Network (SCN)
Project Number: 3276
Budget Activity: #7 Operational Systems Support
Old Budget Activity: #6 Defense Wide Mission Support
Date: February 1994

(U) The SCN has an aggressive Improvement & Modernization (I&M) program to reduce the cost of satellite operations in the future and to operate effectively with fewer, lower skilled personnel. Two major efforts initiated in FY 93 were approved for continued development and implementation in the FY 94 budget process. The Advanced Satellite Control (ASC) and AFSCN Communications Enhancement and Modernization (ACEM) are currently planned to be accomplished on a time-phased approach. Both efforts will heavily exploit existing commercial developments.

(U) ASC is an evolutionary upgrade to the current command and control segment which will move satellite command and control from a mainframe-based, centralized computer architecture to a workstation-based, open architecture using advanced high speed data links. When developed and fielded, ASC will facilitate a 15% reduction in crew manning and a 40% reduction in sustaining engineering for the command and control segment. In addition, the SCN will have greater capability and capacity with increased standardization and interoperability.

(U) ACEM eliminates the current, costly point-to-point AFSCN communications network and replaces it with a communications grid system that integrates government and commercial networks. This new architecture will eliminate costly infrastructure, enable surge capability, and provide a minimum 40% savings in O&M costs over the current systems. ACEM will greatly improve capacity, reliability, data quality, and user access to the network.

(U) Research category is 6.7. Development of new satellite control capabilities is essential to the operational capability of new satellite systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:

(U) - Provided system engineering and development of network hardware/software to meet evolving program requirements at the Consolidated Space Test Center (CSTC) at Onizuka AFB, Consolidated Space Operations Center (CSOC) at Falcon AFB, and the Automated Remote Tracking Stations (ARTS). 57.3M

(U) - Completed transition of satellite programs from the old data systems configuration to a new computer configuration. 3.0M

(U) - Completed upgrade of three stations and two satellite prelaunch checkout facilities under Automated Remote Tracking Stations (ARTS) Acquisition II. 8.4M

Program Element: #0305110F
PE Title: Satellite Control Network (SCN)
Project Number: 3276
Budget Activity: #7 Operational Systems Support
Old Budget Activity: #6 Defense Wide Mission Support
Date: February 1994

(U) - Began preliminary requirement definitions, feasibility studies, demos, and technology surveys/assessments for two major I&M efforts (ASC & ACEM). Received command and service authorization to proceed. Scheduled program completion FY03. 24.0M

2. (U) FY 1994 Planned Program:
   (U) - Continue system engineering, development and integration of network hardware/ software to meet evolving satellite program requirements at Air Force Space Test & Evaluation Center (AFSTEC), CSOC, and the ARTS. 51.4M
   (U) - Begin design specification for ASC upgrades, provide prototype common workstations/local area network, and begin phase 1 of Orbit Analyst Workstation development. Scheduled completion FY03. 39.2M
   (U) - Begin design specification for the ACEM upgrades and provide beginning of open architecture to the AFSCN control nodes. Scheduled program completion FY02. 5.5M

3. (U) FY 1995 Planned Program:
   (U) - Continue system engineering and development of network hardware/software to meet evolving satellite program requirements at Air Force Space Test & Evaluation Center (AFSTEC), CSOC, and the ARTS. 51.5M
   (U) - Complete development of the design specifications for the ASC; provide ASC Training Augmentation Device, provide automated scheduling tools for range operations; begin Phase 2 of the Orbit Analyst Workstation development. Scheduled program completion FY03. 40.9M
   (U) - Complete development of the design specifications for ACEM. Program completion FY02. 8.7M

4. (U) Program to Completion:
   (U) - The AFSCN is a continuing program.
   (U) - ASC and ACEM estimated completion FY 2003 and FY 2002, respectively.

Program Element: #0305110F
PE Title: Satellite Control Network (SCN)
Project Number: 3276
Budget Activity: #7 Operational Systems Support
Old Budget Activity: #6 Defense Wide Mission Support
Date: February 1994

D. (U) WORK PERFORMED BY: In-house efforts and program management will be accomplished by the AF Material Command Space and Missile Systems Center, Los Angeles AFB, CA. Principal contractors are: Loral Space & Range Systems, Sunnyvale, CA, provides study and development analysis for the range facilities and communications; Aerospace Corporation, El Segundo, CA, provides general system engineering and integration support; Space Applications Corporation, San Jose, CA, provides system engineering integration and test analysis (Small Business Set-Aside).

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Project 4045, Integrated Satellite Control System (ISCS) was deferred by the Congress in the FY 94 request. The AF has determined this effort is a system engineering effort rather than a discrete acquisition program. The concept applies system engineering principles to develop standard interfaces and protocols to promote standardization and interoperability between ground control systems. Consequently, remaining Project 4045 FY 96-99 funds have been realigned and included in Project 3276. These funds will be applied to the development of the advanced satellite control capabilities.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: See paragraph 1. above.

F. (U) PROGRAM DOCUMENTATION:
(U) AFSCN Program Management Directive 9038(19), 1 Jun 93

G. (U) RELATED ACTIVITIES:
(U) PE 0305130F, AFSCN Operations.
(U) PE 0305151F, SCN Communications.
(U) PE 0305894F, Real Property Maintenance, AFMC.
(U) PE 0305896F, Base Operating Support, AFMC.
(U) There is no unnecessary duplication of effort within the Air Force or DoD.

Program Element: #0305110F
PE Title: Satellite Control Network (SCN)

Project Number: 3276
Budget Activity: #7 Operational Systems Support
Old Budget Activity: #6 Defense Wide Mission Support

Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ In Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation: Other Procurement		Budget Activity: 83		Program Title: AFSCN, BPAC 834440				
34,701	30,005	25,810	26,410	21,996	27,035	28,833	TBD	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

(U) Provide prototype common workstations/local area network (ASC)	3Q1994
(U) Deliver automated scheduling tools for range operations (ASTRO)	1Q1995
(U) Complete ASC design specs	2Q1995
(U) Deliver ASC Training Augmentation Device	2Q1995
(U) Complete ACEM design specs	3Q1995
(U) Complete Phase 2 of the Orbit Analyst Workstation development	4Q1996

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305111F
PE Title: Weather Service
Project Number: 0001
Budget Activity: #7. Operational Systems Development
Old Budget Activity: #6. Defense-Wide Mission Support
Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Advanced Weather Development Systems								
*6,149	*9,191	20,990	20,404	14,189	13,545	12,997	Cont	TBD

*FY93 and 94 funding is in PE #0604707F. Starting in FY95, PE #0604707F RDT&E funds were assigned to PE #0305111F so that RDT&E, Procurement, and O&M funds for all weather support resources are consolidated under PE #0305111F.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Program Element provides for the acquisition, modification, and sustainment of meteorological hardware and software needed to support the observing and forecasting needs of worldwide Air Force and Army operations. Efforts include; (a) Automated Weather Distribution System (AWDS): automates weather data handling tasks within Air Force and Army weather stations. Pre-planned Product Improvements (P3I) will improve the timeliness of AWDS functions and ensure interoperability with customer command and control (C2), satellite, and weather radar systems; (b) Solar Electro-Optical Network Upgrade (SEON II): improves capability to detect hazardous solar activity for DOD space operations; (c) Combat Weather System (CWS): provides a small, tactical observing and forecasting capability with C2 connectivity for worldwide combat operations; (d) Cloud Depiction and Forecast System II (CDFS II): replaces logistically unsupportable mainframe computers at the Air Force's Global Weather Central and upgrades satellite data processing, cloud depiction and forecasting, and classified weather support functions for national programs and operational commanders. Funding for CDFS II begins in FY95. Research category is Operational Systems Development; all FY95 development efforts support upgrades to currently operational systems, systems already in production, and systems entering into production.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) AWDS/P3I: Developed/demonstrated rapid prototypes for FY93/94 P3I contracts; completed 70% development of C2 systems interfaces and severe weather enhancements; awarded contract for an inter-AWDS communications capability and began development efforts for workstation processing enhancements and a remote briefing capability. ($2.495M)
   - (U) SEON II: Awarded development contract for the solar radio burst locator. ($0.978M)
   - (U) CWS: Awarded development contract for initial rehosting, upgrade, and integration of CWS forecasting software; began development of initial specifications for FY95 CWS competitive contract award. ($2.676M)

2. (U) FY 1994 Planned Program:
   - (U) AWDS/P3I: Develop/demonstrate rapid prototypes for FY94/95 P3I contracts; complete/field C2 interface capability; complete development of the workstation processing enhancement and remote briefing capability; prepare for development of AWDS

Program Element: #0305111F
PE Title: Weather Service

Project Number: 0001
Budget Activity: #7, Operations Systems Development
Old Budget Activity: #6, Defense-Wide Mission Support

Date: February 1994

weather satellite and weather radar data ingest capabilities. ($3.880M)
- (U) SEON II: Complete development/disposition of the solar radio burst locator. ($0.500M)
- (U) CWS: Continue initial CWS software rehosting and upgrading efforts; finalize specifications and release RFP package to industry for FY95 competitive contract award. ($4.811M)

3. (U) FY 1995 Planned Program:
   - (U) AWDS/P3I: Develop/demonstrate rapid prototypes for FY95/96 P3I contracts; complete inter-AWDS capability; complete development of AWDS weather satellite and weather radar data ingest capabilities. ($5.368M)
   - (U) CWS: Complete software rehosting/upgrading efforts; award CWS contract to begin hardware/software integration and test/ evaluation of commercial off-the-shelf observing equipment; begin development of the first Incremental Technological Insertion (ITI) element, i.e. development of a CWS and Small Tactical Terminal (STT) interface. ($5.622M)
   - (U) CDFS II: Begin development of classified support functions and cloud depiction and forecast software. ($10.0M)

4. (U) Program To Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: The AWDS, SEON II, and CWS programs are managed by Electronic Systems Center (ESC), Hanscom AFB, MA. The AWDS contractor is Contel Corporation, Westlake Village, CA. The initial CWS software development contract uses the ESC Portable Reusable Integration Software Modules (PRISM) contract (Raytheon/ Hughes-teamed effort), Hanscom AFB, MA. The final CWS competitive contract will be awarded in FY95. The SEON II solar radio solar burst contractor is CalTech, Los Angeles, CA. The CDFS II program is managed by the Space and Missiles Center (SMC), Los Angeles, CA. The CDFS II contract will be awarded in FY95.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:

- (U) AWDS/P3I: ROC 2/77; ORD 12/93.
- (U) SEON II: SON 6/87.
- (U) CWS: SON 3/90; ORD 10/92.
- (U) CDFS II: MNS 9/92; ORD 9/93.

Program Element: #0305111F
PE Title: Weather Service

Project Number: 0001
Budget Activity: #7, Operations Systems Development
Old Budget Activity: #6, Defense-Wide Mission Support

Date: February 1994

G. (U) RELATED ACTIVITIES:

- (U) PE #0603707F, Weather Systems Technology.
- (U) PE #0305160F, Defense Meteorological Satellite Program.
- (U) PE #0207438F, Theater Battle Management C4I.
- (U) PE #0208006F, Air Force Mission Planning Systems.
- (U) Joint Potential Designator (JPD): Joint Interest.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation Other Procurement (P-1 Line #90); Budget Activity #83; Program Title Weather Service								
50,648	48,230	21,264	53,840	45,817	41,110	45,024	Cont	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

	Program	Event	Date
1.	Automated Weather Distribution System	Final P3I Contract	1FY97
		Program Complete	4FY98
2.	Solar Electro-Optical Network II	Complete Prototype	4FY94
		Program Complete	4FY94
3.	Combat Weather System	Competitive Contract	2FY95
		Incremental Technology Insertion	FY96-00
		Program Complete	4FY00
4.	Cloud Depiction and Forecast System II	Contract Award	1FY95
		Program Complete	3FY98

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0305114F
PE Title: Air Traffic Control and Landing Systems (ATCALS)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence and Communications

Date: February 1994

A. (U) RESOURCES ($ In Thousands):

FY 93 Act	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	Y 98 Est	FY 99 Est	To Complete	Total Program
Project Number 2026, ATCALS Systems Support								
300	280	274	284	278	288	299	1,500	52,700
Project Number 3587, Microwave Landing System Avionics								
11,730	8,320	7,292	5,287	6,332	4,767	4,976	3,500	104,000
12,030	8,600	7,566	5,571	6,610	5,055	5,275	5,000	156,700

B. (U) BRIEF DESCRIPTION OF ELEMENT: This effort develops the Military Microwave Landing System Avionics (MMLSA) and supports the acquisition of the commercially developed Commercial Microwave Landing System Avionics (CMLSA). This acquisition is part of the twenty year program to transition Air Force operations from use of Precision Approach Radars (PAR) and Instrument Landing Systems (ILS) to the Microwave Landing System (MLS) for precision approach and landing. The MMLSA is being developed for integration and installation on space constrained aircraft. MMLSA will have both MLS and ILS capabilities. The CMLSA will be installed in aircraft that do not have size and weight constraints, such as the C-130. Project 2026 funds ongoing liaison, and interagency cooperative studies, between the USAF ATCALS program office and various organizations to include the other Services, the Federal Aviation Administration (FAA) and the International Civil Aviation Organization (ICAO). This program

Program Element: 0305114F
PE Title: Air Traffic Control and Landing Systems (ATCALS)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence and Communications

Date: February 1994

element is in Research Category #7, Operational Systems Development, because it is upgrading avionics in currently fielded weapon systems.

C. (U) JUSTIFICATION FOR PROJECT LESS THAN $10 MILLION IN FY 1995 AND FY 1996:

1. (U) Project 2026, System Support: This continuing effort funds ongoing liaison, and interagency cooperative studies, interoperability evaluations between the USAF ATCALS program office and various organizations to include the other Services, the FAA and the ICAO. Continues mission support for ATCALS programs including several joint efforts with the FAA. ($ in Millions)

(U) FY 1993 Accomplishments:
- (U) Continued support for all ATCALS projects. (50)
- (U) Completed DT&E for Tower Restoral Vehicle (TRV). (100)
- (U) Support integration of Special Use Airspace and air traffic control operations. (50)
- (U) Support field test activities, interoperability evaluations, and related technical support between DoD and FAA for ATCALS and National Airspace System (NAS). (100)

(U) FY 1994 Plans:
- (U) Continue support for all ATCALS projects. (100)
- (U) Support field test activities, interoperability evaluations, and related technical support between DoD and FAA for ATCALS and NAS. (100)
- (U) Support portable precision landing system studies for Joint Special Operations Command (JSOC).

(U) FY 1995 Plans:
- (U) Continue support for all ATCALS projects. (100)
- (U) Support field test activities, interoperability evaluations, and related technical support between DoD and FAA for ATCALS and NAS. (100)
- (U) Continue support of portable precision landing system studies for Joint Special Operations Command (JSOC).

Program Element: 0305114F **Date:** February 1994
PE Title: Air Traffic Control and Landing Systems (ATCALS)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence and Communications
(100)

(U) Work Performed By: Air Force Materiel Command, Electronic Systems Center, Hanscom AFB MA manages the overall ATCALS effort.

(U) Related Activities:
- (U) Program Element #0305137F, National Airspace System.
- (U) Program Element #0305164F, NAVSTAR Global Positioning System.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project Number 3587, Microwave Landing System Avionics: This effort develops the Military Microwave Landing System Avionics (MMLSA) and supports the acquisition of the commercially developed Commercial Microwave Landing System Avionics (CMLSA). This acquisition is part of the twenty year program to transition Air Force operations from use of Precision Approach Radars (PAR) and Instrument Landing Systems (ILS) to the Microwave Landing System (MLS) for precision approach and landing. The MMLSA will be developed for integration and installation on space constrained aircraft. MMLSA will have both MLS and ILS capabilities. The CMLSA will be installed in aircraft that do not have performance, size and weight constraints, such as the C-130. ($ in Millions)

(U) FY 1993 Accomplishments:
- (U) MMLSA EMD Phase II contract awarded. (9100)
- (U) Began aircraft installation kit development. (100)
- (U) Continued MLS testing and integration. (2400)
- (U) Began study with the FAA to determine a national precision approach strategy. (100)

Program Element: 0305114F **Date:** February 1994
PE Title: Air Traffic Control and Landing Systems (ATCALS)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence and Communications

(U) FY 1994 Plans:
- (U) Continue MMLSA EMD Phase II. (6600)
- (U) Continue MLS testing and integration. (400)
- (U) Begin aircraft installation kit testing and integration. (1000)
- (U) Continue national precision approach strategy study. (1000)

(U) FY 1995 Plans:
- (U) Conduct MMLSA DT&E. (700)
- (U) Continue MMLSA EMD Phase II. (5400)
- (U) Continue national precision approach strategy study. (100)
- (U) Begin MMLSA IOT&E. (100)

(U) Work Performed By: MMLSA EMD Phase I contracts were awarded to Rockwell International, Cedar Rapids IA; GEC/Marconi Corp, Wayne NJ; and Hazeltine Corp, Greenlawn NY. General Dynamics working with Aeronautical Systems Center, Wright-Patterson AFB OH completed F-16 system integration laboratory testing. GEC/Marconi Corp, Wayne NJ, is producing the CMLSA system. Warner Robins Air Logistics Center, Warner Robins AFB GA, is developing the kit to install the CMLSA on the C-130. Electronic Systems Center, Hanscom AFB MA manages the MLS Avionics project.

(U) Related Activities:
- (U) Part of the overall USAF MLS acquisition which includes acquisition of the Fixed Base MLS, and Mobile MLS.
- (U) USAF lead agency for tri-service program working concurrently with the FAA.
- (U) Global Positioning System (GPS) to be investigated as an alternative to precision distance measuring equipment (Program Element #0305164F).
- (U) MLS Avionics are being installed on C-130 (Program Element # 0401115F)
- (U) Microwave Landing Systems support the DoD National Airspace System (NAS) program by

Program Element: 0305114F **Date:** February 1994
PE Title: Air Traffic Control and Landing Systems (ATCALS)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #5 - Intelligence and Communications

modernizing air traffic control ground systems (NAS Program Element # 0305137F).

- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands):

Appropriation 3010, Budget Activity #5 - Intellignece and Communications Program Title MLS

FY 93 Act	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
9,300	5,500	3,200	8,300	350	350	360	716,100	773,100
(37)	(33)	(39)					(TBD)	(TBD)

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305119F
PE Title: Medium Launch Vehicle
Budget Activity: 7 Operational System Support
Old Budget Activity: 6 Defense Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
624A Medium Launch Vehicles								
16,399	26,458	17,975	22,476	17,168	14,524	25,156	Cont	TBD
4233 Small Launch Vehicles (SLV)								
12,692	20,823	000	000	000	000	000	000	000
4326 Austere Launch Improvement Investments (ALII) program								
000	7,852	3,067	51,003	69,860	110,714	105,292	Cont	TBD
4303 Air Force Dual Use Launch Facility Grant Program								
10,000	000	000	000	000	000	000	Cont	TBD
4208 Rentry System Launch Program (RSLP)								
000	16,035	000	000	000	000	000	000	000
Total								
46,559	71,168	21,042	73,479	87,028	125,238	130,448	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT. National Security requirements dictate a continuing, highly reliable means of placing critical Department of Defense (DoD) satellites into required orbits. Assured access to space, directed by the President in the National Security Launch Strategy, will be accomplished through the use of a robust mix of Expendable Launch Vehicles (ELVs). The Medium Launch Vehicle (MLV) program provides sustainment, procurement and launch of DoD ELVs, including Atlas II and Delta II at Cape Canaveral AFS, FL and Delta II, Atlas II, and Atlas E at Vandenberg AFB, CA. This program also provides for engineering support of active launch programs and post-flight assessment of DoD ELVs to maintain their high reliability. In FY93, this PE included funding for the Titan II program ($7.468M), and for the Congressionally directed Dual Use Space Launch Facility Grant Program ($10.0M), which is now continued under PE 035182F. FY94 is the last year this PE will include funding for the Small Launch Vehicle (4233) program, and the Reentry System Launch Program (4208). Accomplishments and plans for SLV and RSLP are discussed in descriptive summaries for PE 0603402F (Space Test) and PE 0603308F (Strategic Missile Modernization) respectively.

Program Element: #0305119F
PE Title: Medium Launch Vehicle
Budget Activity: 7 Operational System Support
Old Budget Activity: 6 Defense Wide Mission Support

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0MILLION IN FY 1995:

1. (U) Project 4326 Austere Launch Improvement Investments (ALII) Program:
National space launch strategy directs the sustainment of current space launch vehicles. In this medium launch vehicle class primary payloads will continue lift satellites are downsized to MLV transfer orbits. The ALII program will pursue only critical upgrades to sustain fleet and meet new payload requirements.

(U) FY 1993 Accomplishments:
(U) Not funded in FY93. FY94 funding approved and directed in Space Launch Infrastructure Improvement Program.

(U) FY 1994 Planned Program:
(U) MLV specific launch infrastructure improvements:MLV common blockhouse, mission director center, engine test stand, range to vehicle upgrades $7,852.

(U) FY 1995 Planned Program:
(U) Continue MLV launch infrastructure improvements from FY94: $3,067

(U) Worked Performed By: The responsible Air Force agency is Air Force Material Command's Space and Missile Systems Center, Los Angeles AFB, CA. Systems engineering is provided by the Aerospace Corporation, El Segundo, CA. Prime and subcontractors are TBD.

(U) Related Activities:
(U) Classified space programs.
(U) Defense Satellite Communications System (DSCS) (PE 0303110F).
(U) Global Positionging System (GPS) (PE 0305165F)
(U) Space Test Program (STP) (PE0603402F)
(U) Titan Space Launch Vehicles (PE0305144F)
(U) There is no unncessary duplication of effort within the AF or DoD.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305119F
PE Title: Medium Launch Vehicle

Project: 624A
Budget Activity: 7-Operational System Support
Old Budget Activity: 6 Defense Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
624A Medium Launch Vehicles								
16,399	26,458	17,975	22,476	17,168	14,524	25,156	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: National Security requirements dictate a continuing, highly reliable means of placing critical Department of Defense (DoD) satellites into required orbits. Assured access to space, directed by the President in the National Security Launch Strategy, will be accomplished through the use of a robust mix of Expendable Launch Vehicles (ELVs). The Medium Launch Vehicle (MLV) program provides sustainment, procurement and launch of DoD ELVs, including Atlas II and Delta II at Cape Canaveral AFS, FL and Delta II, Atlas II, and Atlas E at Vandenberg AFB, CA. This program also provides for engineering support of active launch programs and post-flight assessment of DoD ELVs to maintain their high reliability.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
- (U) Delta II launched seven GPS satellites (engineering, mission and complex support): $1,070
- (U) Atlas II launched one DSCS III (engineering, mission and complex support): $1,954
- (U) MLV III contract awarded 9 Apr 93. Planned site activation, logistics support analysis and GPS IIR new mission design work: $7,449
- (U) Environmental compliance and clean propellant studies continued: $5,886

2. (U) FY 1994 Planned Program:
- (U) Atlas II launched DSCS (4th)
- (U) Delta II range safety compliance upgrades continued. $9,000
- (U) Continue MLV III/GPS IIR new mission integration: $6,542
- (U) Management of West Coast Atlas II activation continues: $1,197
- (U) Engineering, mission and launch complex support required for launching 3 Delta II/GPS IIA and 1 Atlas II/DSCS III: $9,719

Program Element: #0305119F
PE Title: Medium Launch Vehicle

Project: 624A
Budget Activity: 7-Operational System Support
Old Budget Activity: 6 Defense Wide Mission Support

Date: February 1994

3. (U) FY 1995 Planned Program:
- (U) Engineering, mission and launch complex support required for launching 1 Delta II/GPS IIA, 1 Delta II/STP (ARGOS) at Vandenberg, and 1 Atlas II/DSCS III: $9,054
- (U) Delta II range safety compliance upgrades completed, first flight with new upgrades this year: $5,000
- (U) West Coast Atlas II activation continues: $1,221
- (U) Complete MLV III site activation and GPS IIR mission integration: $2,700

4. (U) Program to Completion:
- (U) *This is a continuing program necessary to provide assured access for the Nation's critical space systems using Delta II and Atlas II space launch systems.*

D. (U) Work Performed By: The responsible Air Force agency is Air Force Material Command's Space and Missile Systems Center, Los Angeles AFB, CA. Systems engineering is provided by the Aerospace Corporation, El Segundo, CA. Delta II contractors include: McDonnell Douglas Space Systems Corporation, Huntington Beach, CA (prime contractor); Rockwell International Corporation, Rocketdyne Division, Canoga Park, CA (stage 1 rocket engines); Aerojet Liquid Rocket Company, Sacramento, CA (stage 2 rocket engines); General Motors Corporation, Delco Electronics Division, Santa Barbara, CA (guidance); Morton Thiokol Corporation, Huntsville, AL and Elkton, MD (solid rocket motors); Hercules Corporation, Magna, UT (solid rocket motors). Atlas Contractors include: General Dynamics, Space Systems Division, San Diego, CA (integration, Centaur upper stage and airframe) and Rockwell International, Rocketdyne Division, Canoga Park, CA (rocket engines).

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
- (U) National Space Policy, January 1988.
- (U) Program Decision Memorandum, 25 July 1988.
- (U) MLV III MNS, 30 Nov 1992.

Program Element: #0305119F
PE Title: Medium Launch Vehicle

Project: 624A
Budget Activity: 7-Operational System Support
Old Budget Activity: 6 Defense Wide Mission Support

Date: February 1994

G. (U) RELATED ACTIVITIES:
- (U) Classified space programs.
- (U) Defense Satellite Communications System (DSCS)(PE 0303110F).
- (U) Global Positioning System (GPS)(PE0305165F).
- (U) Defense Meteorological Satellite Program (DMSP)(PE0305160F).
- (U) Space Test Program (STP) (PE0603402F).
- (U) National Oceanic and Atmospheric Administration (NOAA) polar orbiting meteorological satellites.
- (U) Titan Space Launch Vehicles (PE0305144F)
- (U) There is no unnecessary duplication of effort within the AF or the DoD.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands)
- (U) Missile Procurement (BA#5/MSML00)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
263,637	138,952	149,044	194,634	251,830	347,923	371,648	Cont	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE:

1. Atlas II first launch	February 1992
2. MLV III contract award	April 1993
3. MLV III first launch	2nd Qtr FY 1996

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305137F
PE Title: National Airspace System (NAS)
Project Number: None
Budget Activity: # 7-Operational Systems Development
Old Budget Activity: # 4-Tactical Programs
Date: February 1994

Project Title: National Airspace System (NAS)

No Photo Available

Program Element: #0305137F
PE Title: National Airspace System (NAS)

Project Number: None
Budget Activity: # 7-Operational Systems Development
Old Budget Activity: # 4-Tactical Programs

Date: February 1994

POPULAR NAME: NAS

A. (U) SCHEDULE/BUDGET INFORMATION ($ In Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones		MS II-03/94			MS III-2Q/97		IOC-4Q/99	FOC-2Q/04
Engineering Milestones	Auto CDR 10/93							
T&E Milestones			NAS DT 1/95	MAMS DT 10/95 NAS OT 3/96 MAMS OT 4/96 NAS End OT 9/96				
Contract Milestones		MAMS EMD 4/94		MAMS Prod 3Q/96				
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	2,522	11,600	24,200	12,800	7,900			TBD (Cont)
Support Contract	2,900	1,000	2,013	2,000	2,000			TBD (Cont)
In-House Contract	500	500	500	500	500	195	38	TBD (Cont)
GFE/Other	512	1,607	4,267	3,327	3,236			TBD (Cont)
Total	6,434	14,707	30,980	18,627	13,636	195	38	TBD (Cont)

Program Element: #0305137F
PE Title: National Airspace System (NAS)
Project Number: None
Date: February 1994
Budget Activity: #7-Operational Systems Development
Old Budget Activity: #4-Tactical Programs

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENTS AND SYSTEM CAPABILITIES: The DoD National Airspace System program will modernize the DoD air traffic control (ATC) system in parallel with the FAA. DoD will acquire, to the maximum extent practical, systems on contract or systems to be on contract with the FAA to reduce development costs and prevent duplication. The DoD NAS program provides systems and facilities compatible/interoperable with the FAA modernization, prevents DoD flight delays and cancellations, continues DoD's access into Special Use Airspace (SUA), provides transparent services to military and civil aircraft, replaces aging DoD ATC systems, and increases flight safety. The Military Airspace Management System (MAMS) will effectively schedule and manage SUA. DoD military ATC and fighting/flying readiness will be maintained. Since this program is designed to modernize the DoD ATC system, which is an operational system, this PE is categorized as an operational systems development effort and funding has been included in budget activity seven.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Conduct MAMS system design & software specification reviews (0.6M).
   - (U) - Continue site surveys, facility/transition planning (0.8M).
   - (U) - Begin update of the COEA to support Development Approval decision (0.8M).
   - (U) - Begin development of NAS Integration Plan (1.6M).
   - (U) - Evaluate Secondary Surveillance Radar requirements (2.2M).
   - (U) - Update NAS specifications (0.7M).

2. (U) FY 1994 Planned Program:
   - (U) - Award MAMS EMD Contract (5.6M).
   - (U) - Continue site surveys, facility/transition planning (0.8M).
   - (U) - Continue the development of the NAS Integration Plan (0.2M).
   - (U) - Continue update of the COEA (0.5M).

Program Element: #0305137F
PE Title: National Airspace System (NAS)
Project Number: None
Budget Activity: # 7-Operational Systems Development
Old Budget Activity: # 4-Tactical Programs
Date: February 1994

(U) - Begin overall technical/engineering and integration of NAS subsystems for each DoD site (0.8M).
(U) - Award NAS Test Systems contracts (2.0M).
(U) - Identify NAS requirements to meet the needs of Major Range and Test Facility Bases (MRTFBs) (0.8M).
(U) - Develop DoD Common Console (4.0M).

3. (U) FY 1995 Planned Program:
   (U) - Continue MAMS EMD Contract (10.4M).
   (U) - Continue technical/engineering and integration of NAS subsystems (3.1).
   (U) - Continue site surveys, facility planning, and transition planning (2.0M).
   (U) - Continue to update COEA (0.5M).
   (U) - Continue test systems integration contracts (8.3M).
   (U) - Begin NAS and MAMS developmental testing (2.0M).
   (U) - Continue development of DoD Common Console (3.5M).
   (U) - Continue NAS MRTFB requirements (1.1M).

4. (U) Program to Completion:
   (U) - Complete MAMS EMD (8.0M).
   (U) - Continue technical engineering and integration of the NAS subsystems (2.7M).
   (U) - Continue site surveys, facility planning and transition planning (2.538M).
   (U) - Continue to update COEA for Milestone III (0.7M).
   (U) - Continue test integration contracts (5.5M).
   (U) - Complete development of DoD Common Console (2.0M).
   (U) - Complete NAS MRTFB requirement identification (1.5M).
   (U) - Begin and complete connectivity design and analysis (0.9M)

Program Element: #0305137F
PE Title: National Airspace System (NAS)

Project Number: None **Date:** February 1994
Budget Activity: # 7-Operational Systems Development
Old Budget Activity: # 4-Tactical Programs

(U) - Installation and testing of NAS equipment in prototype air traffic control facilities (Control Towers, Radar Approach Controls (RAPCONs), and Major Range and Test Facility Bases (MRTFBs) in FY 96-98.
(U) - Acquisition and installation of the Advanced Automation System, Voice Communications Switching System, Mode S, Digital Airport Surveillance Radar, and other systems in FY 97-2002.
(U) - DoD ATC facilities modifications/construction starting in FY97.
(U) - Integration of DoD NAS systems/facilities, FY 1998-2004.

D. (U) Work Performed By: This program is managed by Electronic Systems Center, Hanscom AFB MA. USAF is the lead Service and responsible for the management of the Joint Service Program Office. Contractor(s) are TBD. Developmental efforts for the NAS automation system, the airport surveillance radar, Mode S radar beacon system, and others are the responsibility of the FAA. Engineering support provided by MITRE Corp, Bedford MA, and Martin-Marietta Corp, Washington DC.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: Rephasing the program to reduce cost and technical risk resulted in IOC and FOC being shifted outward.
3. (U) COST CHANGES: FY 94 funds reduced by Congress adjusted funding for Federally Funded Research and Development Centers and shifted Engineering Manufacturing Development costs to FY 95 and FY 96.

F. (U) PROGRAM DOCUMENTATION:
(U) - Air Force Communications Command Statement of Need 04-87, National Airspace System Compatible Air Traffic Control Facilities, 27 Oct 87.

Program Element: #0305137F
PE Title: National Airspace System (NAS)
Project Number: None
Date: February 1994
Budget Activity: # 7-Operational Systems Development
Old Budget Activity: # 4-Tactical Programs

(U) - Mission Need Statement, MAMS, JROCSM 88-099, 12 Dec 88
(U) - Memorandum of Agreement Between the Federal Aviation Administration and the Department of Defense on Radar Approach Controls in the NAS, 24 Sep 93.
(U) - Joint Requirements Oversight Council Mission Need Statement for NAS Modernization, JROCSM 89-019-89, 17 May 89.
(U) - DoD Directive 5030.19, DoD Responsibilities on Federal Aviation and NAS Matters, 22 Jun 89.
(U) - FAA Capital Investment Plan, Dec 90.
(U) - Operational Requirements Document 001-85-I, Military Airspace Management System (MAMS), 22 Jun 92.
(U) - NAS Acquisition Decision Memorandums, 13 Nov 90 and 5 Nov 92.
(U) - Joint Systems Operational Requirements Document (ORD 04-87), ATCALS for Terminal and Special Use Airspace in the NAS, 14 May 92.
(U) - Cost and Operational Effectiveness Analysis (COEA), 23 Apr 92.

G. (U) RELATED ACTIVITIES:

(U) - NAS is part of the overall effort for the USAF acquisition of Air Traffic Control and Landing Systems (ATCALS) (PE #0305114F).
(U) - Program Element #0204696N, Navy ATCALS.
(U) - Program Element #0604633A, Army ATCALS.
(U) - There is no unnecessary duplication of effort.

Program Element: #0305137F
PE Title: National Airspace System (NAS)

Project Number: None
Budget Activity: #7-Operational Systems Development
Old Budget Activity: #4-Tactical Programs

Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

Appropriation: 3080, Budget Activity: BA 16, Program Title: NAS

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
0	0	0	4,611	25,661	88,584	65,975	163,200	348,031

Appropriation: 3300 Budget Activity: BA 24 Program Title: NAS

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
0	0	0	300	2,900	4,800	4,800	12,300	25,100

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results

T&E ACTIVITY (TO COMPLETION)

Program Element: #0305137F
PE Title: National Airspace System (NAS)

Project Number: None **Date:** February 1994
Budget Activity: # 7-Operational Systems Development
Old Budget Activity: # 4-Tactical Programs

Event	Date	Results
NAS DT&E Start/Finish	Jan 95/Mar 96	FAA will conduct
MAMS DT&E Start/Finish	Oct 95/Mar 96	
MAMS IOT&E Start/Finish	Apr 96/Jul 96	
NAS IOT&E Start/Finish	Mar 96/Sep 96	FAA will conduct (w/DoD assistance, includes Automation, Radar and Voice Switch systems)

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305138F
PE Title: Upper Stages Program
Budget Activity: 7 - Operational System Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ In Thousands):

	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
4053 Upper Stages Development (Inertial Upper Stage)									
	1,625	4,118	3,663	3,597	3,349	3,519	3,606	Continuing	TBD
Total									
	1,625	4,118	3,663	3,597	3,349	3,519	3,606	Continuing	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Upper Stages Program provides consolidated acquisition of upper stages to support the DoD Mission Model. The majority of the Upper Stages effort is in support of the Inertial Upper Stage (IUS). This effort includes flight operations at the Eastern Launch Site (ELS), FL; support to flight operations at the Consolidated Space Test Center (CSTC); and reimbursable acquisition and operations support of upper stages for NASA as documented in MOA/MOU's between USAF and NASA. Lastly, the program continuously evaluates and improves upper stage reliability, cost effectiveness, and responsiveness.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) Project 4053, Upper Stages Development (Inertial Upper Stage): IUS supports the launch of DSP satellites. IUS is the upper stage on a Titan IV (or it can be modified for Shuttle) and will take the DSP satellite from 150 nautical miles using a Hohman transfer and deliver the spacecraft to approximately a 23,000 mile circular orbit. RDT&E specifically supports redesigns of aging equipment and spares which are no longer manufactured or available, investigation of flight anomalies, and small studies to assist in defining future upper stages.

Program Element: #0305138F
PE Title: Upper Stages Space Vehicles
Budget Activity: 7 - Operational System Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

(U) FY 1993 Accomplishments:
(U)- Provided studies/analyses in support of one DoD mission ($625,000)
(U)- Performed anomaly resolution from last IUS flight and requalification of batteries ($1,000,000)

(U) FY 1994 Plans:
(U)- Study and design corrective actions for anomalies and obsolete items ($4,118,000)

(U) FY 1995 Plans: Same as FY 1994 ($3,663,000)

(U) Work Performed By: The responsible Air Force agency is Air Force Materiel Command's Space and Missile Systems Center, Los Angeles AFB, CA. Systems engineering is provided by the Aerospace Corporation, El Segundo, CA. The prime contractor for IUS, associated integration, engineering support and launch support is Boeing Aerospace and Electronics Company, Seattle, WA. Independent verification of flight software is performed by Martin Marietta Corporation, Denver, CO.

(U) Related Activities:
(U)- All future Air Force Inertial Upper Stages (IUS's) will be launched from Titan IV's (PE 0305144F, Titan Vehicles).
(U)- IUS's mission supports the Defense Satellite Program (DSP) satellites (PE 0102431F, DSP).
(U)- Past call-up capability for the Defense Satellite Communications System (DSCS) (PE 0303110F, DSCS) has been terminated.
(U)- IUS program supports the NASA Space Transportation System as the upper stage for use with the Space Shuttle (In prior years PE 0305171F, Space Shuttle Operations).

Program Element: #0305138F
PE Title: Upper Stages Space Vehicles
Budget Activity: 7 - Operational System Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands):

	FY 93 Est	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est
Appropriation: 3020 , Budget Activity: Space and Other Support , Program Title: Inertial Upper Stage							
Funds	86,967	72,917	103,518	57,338	55,014	56,799	58,660
Quantities	0	0	0	0	0	0	0

(U) International Cooperative Agreements: Not Applicable.

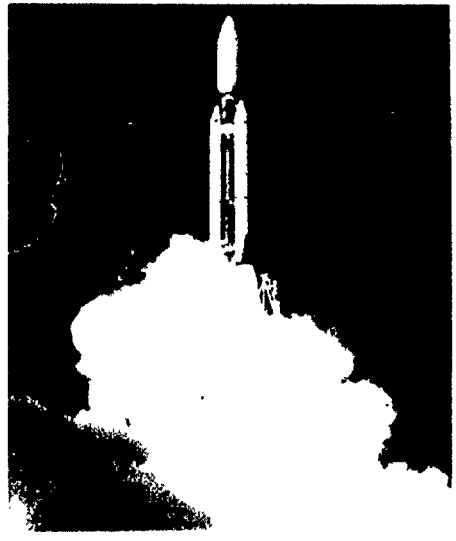
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0305144F
PE Title: Titan Space Launch Vehicles

Project Number: 4135
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 6-Defense Wide Mission Support

Date: February, 1994

Project Title: Titan IV/Titan II



Program Element: 0305144F
PE Title: Titan Space Launch Vehicles

Project Number: 4135
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 6-Defense Wide Mission Support

Date: February, 1994

POPULAR NAME: TITAN IV/TITAN II

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones		DAB Prog Rvw (5/94)						
Engineering Milestones		SRMU CDR Centaur Launch						
T&E Milestones	SRMU DT QM-4 (9/93)							
Contract Milestones			Follow-On Long Lead	Follow-On Full Authority				
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	134,046	249,936	136,696	134,336	95,004	121,372	173,071	CONT
Support Contract	4,039	10,489	15,000	14,850	12,000	12,000	12,000	CONT
In-House Contract	9,106	9,700	9,400	6,500	3,000	3,000	3,000	CONT
GFE/Other	0	0	0	0	0	0	0	CONT
Total	147,191	270,125	161,096	155,686	110,004	136,372	188,071	CONT

Program Element: 0305144F
PE Title: Titan Space Launch Vehicles
Project Number: 4135
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 6-Defense Wide Mission Support
Date: February, 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: National security requirements dictate a continuing, highly reliable means of placing critical DoD satellites into required orbits. The Titan IV program provides the capability to launch the largest of these satellites into near-earth or geosynchronous orbits from either the east or west coast launch facilities. This program is developing several different configurations for the Titan IV [No Upper Stage (NUS), Inertial Upper Stage (IUS), and Centaur]. In addition, the Titan IV program is developing a solid rocket motor upgrade (SRMU) and new programmable avionics and ground support equipment to meet reliability and increased performance requirements. This program provides continuing integration support to the payload community as well as continuing engineering support to enhance system characterization and reliability. Titan IV performance by configuration is summarized below:

Configuration	Mission Orbit	Performance (lbs to orbit)
Titan IV/Centaur/SRM	Geosynchronous	10,000
Titan IV/Centaur/SRMU	Geosynchronous	11,500
Titan IV/IUS/SRM	Geosynchronous	5,200
Titan IV/NUS/SRM	Low Earth (Polar)	31,100
Titan IV/NUS/SRMU	Low Earth (East)	47,800

Beginning in FY94, this program element also includes funding consisting of engineering costs, payload integration, and Government costs for the Titan II space launch vehicle. This activity is included as operational systems development since both Titan II and Titan IV are operational launch vehicles.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   (U) - Develop range safety-compliant systems ($16.8M)
   (U) - Continue Centaur and continue SRMU developments ($1.2M)
   (U) - Continue integration for Milstar and Defense Support Program (DSP) ($21.4M)
   (U) - Continue facility mods and upgrades ($21.2M)
   (U) - Implement engineering changes ($20.6M)
   (U) - Continue sustaining engineering ($39.6M)
   (U) - Implement Congressionally-directed SRMU restructure ($26.4M)

Program Element: 0305144F
PE Title: Titan IV Space Launch Vehicles
Project Number: 4135
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 6-Defense Wide Mission Support
Date: February, 1994

2. (U) FY 1994 Planned Program:
   (U) - Continue development of range safety-compliant systems ($74.4M)
   (U) - Complete Centaur and SRMU development ($23.6M)
   (U) - Continue integration for DSP and Milstar ($27.7M)
   (U) - Continue facility modifications and upgrades ($19.8M)
   (U) - Implement engineering changes ($46.5M)
   (U) - Continue development for avionics and support equipment block change ($34.0M)
   (U) - Continue Titan II ($4.5M)
   (U) - Continue sustaining engineering ($39.6M)

3. (U) FY 1995 Planned Program:
   (U) - Continue development of range safety-compliant systems ($25.8M)
   (U) - Continue SRMU development and design storage ($13.0M)
   (U) - Continue integration for DSP and Milstar ($15.4M)
   (U) - Continue facility modifications and upgrades ($21.5M)
   (U) - Implement engineering changes ($39.8M)
   (U) - Continue Titan II ($3.6M)
   (U) Continue sustaining engineering ($42.0M)

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

D. (U) WORK PERFORMED BY: The Program Executive Officer for Space is responsible for program management, with the program office located at Space and Missiles Systems Center, Los Angeles AFB, CA. The Aerospace Corporation, El Segundo, CA, provides systems engineering support to the program office. Martin Marietta Corporation in Denver, CO, is the Titan prime contractor.

Program Element: 0305144F
PE Title: Titan Space Launch Vehicles
Project Number: 4135
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 6-Defense Wide Mission Support
Date: February, 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None, although we are still evaluating potential long term implications of the Titan IV launch failure which occurred August 2, 1993.
2. (U) SCHEDULE CHANGES: Launch of the first Titan IV/Centaur vehicle slipped from FY 1993 to FY 1994 because of Atlas/Centaur launch failures and the Titan IV launch failure of August 2, 1993
3. (U) COST CHANGES: Congress reduced funding for this program in FY 1994, resulting in increased risk to the total program as we complete Centaur and SRMU development. Congress also reduced funding for the Centaur Processing Facility in FY 1994, resulting in schedule delays and increased FY 1995 costs. Some of the FY 1994 reductions may be accommodated by planned NASA reimbursement for a Titan IV to launch the Cassini mission. FY 1995 funding is increased to accommodate previously-recognized program shortfalls through the FYDP.

F. (U) PROGRAM DOCUMENTATION:
- (U) Acquisition Program Baseline (APB) (Change 2), 6/93
- (U) Titan IV Operational Requirements Document (ORD), 8/93
- (U) Test and Evaluation Master Plan (TEMP), 11/93

G. (U) RELATED ACTIVITIES:
- (U) Classified Space Programs (classified user launch vehicles and Vandenberg AFB launch services)
- (U) PE 0102431F, Defense Support Program
- (U) PE 0303601F and PE 0604479F, Milstar
- (U) PE 0305119F, Medium Launch Vehicles
- (U) PE 0305181F, Western Range
- (U) PE 0305182F, Eastern Range
- (U) PE 0305138F, Upper Stages
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: 0305144F
PE Title: Titan Space Launch Vehicles
Project Number: 4135
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 6-Defense Wide Mission Support
Date: February, 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

	FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation Missile Procurement, Budget Activity 5, Program Title Space Boosters									
	380,044	463,174	422,717	580,912	718,508	823,420	1,006,249	CONT	CONT
(Buy Qty)	0	0	0	1	1	0	1		
Appropriation Military Construction, Budget Activity 01, Program Title Medium Launch Vehicles									
	33,000	0	0	0	0	0	0	CONT	CONT

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) TEST AND EVALUATION DATA: Not Required

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element #0305145F
PE Title: Arms Control
Budget Activity. #7 - Operational Systems Development
Old Budget Activity. #3 - Strategic Programs

Date: February, 1994

A. (U) RESOURCES ($ In Thousands):

Project Number & Title	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
4189 Minuteman III (MM III) De-MIRVing Preparation	3884	2000	0000	0000	0000	0000	0000	0000	14884
4190 Treaty Prep/Verification Support	0382	2067	3923	2445	1738	1801	1874	TBD	TBD
4283 Open Skies Treaty Systems Development	0000	3000	2533	0000	0000	0000	0000	0000	5500
Total	4226	7067	6456	2445	1738	1801	1874	TBD	TBD

B (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES. This element directly supports implementation and planning for current and pending arms control agreements. It includes MM III de-MIRVing actions required to meet re-entry vehicle (RV) limitations under the Strategic Arms Reduction Talks (START) Treaty and the START II Treaty by providing single RV (SRV) capability to the MM III ICBM fleet. Treaty preparation/verification supports activities encompassing a wide range of projects necessary to prepare the United States for compliance with impending arms control treaties and negotiations. Open Skies support includes development of Synthetic Aperture Radars (SAR) and SAR media processing equipment required to support the Open Skies Treaty mission.

Program Element: #0305145F
PE Title: Arms Control
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February, 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN BOTH FY 1995 AND FY 1996:

1. (U) Project 4189, MM III De-MIRVing: This project enables the USAF to comply with START Treaty requirements which mandate a new RV platform when downloading the MM III to a SRV configuration This project includes the research and development costs associated with the new bulkhead design, design testing, and limited production, as well as the software modifications and testing necessary for successful launch in the SRV configuration

(U) FY 1993 Accomplishments:
(U) Continued modification of MM III software. ($3884K)

(U) FY 1994 Plans:
(U) Complete and test hardware and software modifications that permit successful flight in the SRV configuration. ($2000K)

(U) Work Performed By. The contractors for the SRV de-MIRVing effort are Logicon of San Pedro, CA, GTE of Boston, MA; TRW of San Bernadino, CA; Rockwell International of Anaheim, CA, and Martin Marietta of Philadelphia, PA Hill AFB, Utah is the in-house integrating organization responsible for the SRV de-MIRVing program.

(U) Related Activities:
(U) PE 0101213, Minuteman Squadrons, includes funding for operation and support of the MM III system and associated life extension programs.
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0305145F
PE Title: Arms Control
Budget Activity: #7 - Operational Systems Development
Old Budget Activity. #3 - Strategic Programs

Date. February, 1994

(U) Other Appropriation Funds ($ in Thousands):

Approp: Missile Procurement, Budget Activity: 3 Mods/WSC 21XXX, Program Title MM II/III Mods

	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
Funds:	9700	0000	4728	0000	0000	0000	0000	0000	20739
Quantities:	410		210						620

(U) International Cooperative Agreements: Not Applicable.

2 (U) Project 4190, Treaty Prep/Verification Support. This project supports development costs directly associated with preparing for implementation of arms control treaties and agreements. It includes research and analysis activities assciated with preparing the Air Force to meet a myriad of required taskings, and prepares the USAF to support immediate compliance with existing agreements and analyze implications of future agreements and negotiations

(U) FY 1993 Accomplishments:

(U) Completed development and implementation of the AF-wide, multi-level arms control management network and continued analytical research in support of arms control related activities levied on the USAF by State Department, OSD, and Interagency taskings. ($382K)

(U) FY 1994 Plans

(U) Provide for research in support of the Non-Proliferation Treaty, a Comprehensive Test Ban, and counterproliferation policy and programs. ($2067K)

Program Element: #0305145F
PE Title. Arms Control
Budget Activity. #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February, 1994

(U) FY 1995 Plans:
(U) Continue research in support of the Non-Proliferation Treaty, a Comprehensive Test Ban, and counterproliferation policy and programs. ($3870K)

(U) Work Performed By:
(U) The primary contractor for the Treaty Prep/Verification Support effort is SAIC of McLean, VA

(U) Related Activities:
(U) None

(U) Other Appropriation Funds ($ in Thousands):
(U) None.

(U) International Cooperative Agreements: Not Applicable.

3 (U) Project 4283, Open Skies Treaty Systems Development. This project enables the USAF to develop systems necessary to comply with the Open Skies Treaty It includes funding necessary to complete Defense Nuclear Agency's (DNA) development of a prototype Synthetic Aperture Radar (SAR) capability. Funding is required for software development for processing of the SAR magnetic tape and to conduct flight test operations. This project also includes funding necessary to complete engineering design of a hush kit which meets international Stage III aircraft noise abatement standards Without this funding, the USAF and the U.S. Government will be unable to comply with its international obligations under the Open Skies Treaty.

Program Element: #0305145F
PE Title: Arms Control
Budget Activity #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date February, 1994

(U) FY 1993 Accomplishments:
(U) Not Applicable.

(U) FY 1994 Plans:
(U) Complete development and testing of prototype Synthetic Aperture Radar (SAR) ($2000)
(U) Begin development of OC-135B aircraft engine hush kits ($1000)

(U) FY 1995 Plans:
(U) Complete development of OC-135B aircraft engine hush kits. ($2000)
(U) Develop interface software for processing of SAR magnetic tape ($ 500)

(U) Work Performed By: DNA is responsible for development of the prototype SAR. Contractor for development of engine hush kits is TBD. Tinker AFB, Oklahoma City, OK is the in-house developing organization responsible for aircraft accquisition for the Open Skies Treaty

(U) Related Activities:
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands).

Approp: Aircraft Proc., Budget Activity: BSA 5/WSC C13500, Program Title C-135B

	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
Funds.	51186	0	0	7583	0	0	0	0	65673
Quantities.	2			1					3

Program Element: #0305145F
PE Title: Arms Control
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February, 1994

Approp: Other Proc., Budget Activity: 2/WSC 826990, Program Title: Items Less Than $2.0M (Vehic Equip)

	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
Funds.	0	38	39	38	40	41	43	TBD	TBD

Approp. Other Proc., Budget Activity: 3/WSC 837190, Program Title Items Less Than $2 0M (Radio Equip)

	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
Funds.	5	0	0	0	0	0	0	0	5

Approp Other Proc., Budget Activity: 3/WSC 837990, Program Title: Items Less Than $2 0M (Org & Base)

	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
Funds.	0	0	2458	0	0	0	0	0	2410

Approp: Other Proc , Budget Activity: 4/WSC 845310, Program Title: Items Less Than $2.0M (Photo Equip)

	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
Funds:	153	0	0	0	0	0	0	TBD	TBD

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: # 0305158F
PE Title: CONSTANT SOURCE
Budget Activity: 7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Project #:4071	Constant Source							
7,062	3,125	3,259	3,108	3,073	902	857	Continues	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program established as part of the AF TENCAP normalization effort. Program leverages national and tactical capabilities to deliver near-real-time threat information directly to combat units/aircrews for mission planning and mission execution. This information enables air crews to effectively avoid, defeat or destroy enemy threat systems. Currently about 100 ground systems are deployed. Air Force is jointly developing and procuring airborne qualified version called Multi-Mission Advanced Tactical Terminal (MATT) with US Special Operations Command (SOCOM), Defense Support Program Office (DSPO) and the Navy. This Program Element supports the continued development of the operational Constant Source System.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) FY 1993 Accomplishments:

(U) - Finished development of the airborne qualified system (MATT)	$1.30M
(U) - Awarded competitive contract to Allied-Signal for production	
(U) - Completed EMD, DT&E and IOT&E	
(U) - Milestone III decision approval for production and deployment	
(U) - Updated software and executed ECPs for ground systems	$5.60M
(U) - Completed development of ground systems to a multi-channel capability	$0.16M

(U) FY 1994 Plans:

(U) - Begin production of airborne systems and plan for integration on DOD aircraft	$0.05M
(U) - Update software for air/ground systems as required	$2.45M
(U) - Execute ECPs for air/ground systems as required	$0.30M
(U) - Integrate ground systems into Air Force Combat Intelligence System (CIS)	$0.33M

Program Element: # 0305158F
PE Title: CONSTANT SOURCE
Budget Activity: 7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) FY 1995 Plans:

(U) -	Update software and execute ECPs for air/ground systems as required	$2.92M
(U) -	Plan and support integration on DOD aircraft and weapon systems	$0.10M
(U) -	Plan to retrofit existing systems with state-of-the-art components	$0.12M
(U) -	Integrate ground system into CIS	$0.12M

D. (U) WORK PERFORMED BY: Work is managed jointly by the Directorate of Communication and Intelligence Systems, Electronic Systems Center (ESC/1C), Hansom AFB, MA;US Special Operations Command (SOCOM), McDill AFB, FL: and the Defense Support Program Office (DSPO) Operations Support Office (OSO) in the Pentagon. The top five contractors include Assurance Technology Corp., Carlisle, MA; BTG, Inc., Vienna, VA; Mnemonics, Inc., Melbourne, FL; Harris Corp., Melbourne, FL; and Allied-Signal Corp., Baltimore, MD.

E. (U) RELATED ACTIVITIES:

(U) - Program Element #0207247F, Air Force TENCAP
(U) - Program Element #0208019F, Tactical Cryptologic Activities
(U) - Program Element #0305159I, Defense Reconnaissance Support Program
(U) - Program Element #0305885G, Tactical Cryptologic Program
(U) - Program Element #0304111F, Special Activities
(U) - CONSTANT SOURCE formally interfaces with numerous national programs/agencies, the Major Commands and their components, the Air Staff, Office of the Secretary of Defense, Secretary of the Air Force, and the other Services in order to optimize the system's utility and to synchronize design efforts with other system developments.
(U) - The MATT radio development is a multi-organization effort between the Air Force, SOCOM and DSPO. SOCOM, as the Milestone decision authority, approved Milestone III on 22 Sep 93 with production starting on 30 Sep 93. Air Force, SOCOM and Navy have programmed funds for MATT production. Memorandum of Agreement exist between these organizations defining the roles and responsibilities.
(U) - There is no unnecessary duplication of effort within the Air Force. The Army is developing a similar capability (Commanders Tactical Terminal/Hybrid Receive only (CTT/H-R)) to the Constant Source airborne system (MATT).

Program Element: # 0305158F
PE Title: CONSTANT SOURCE
Budget Activity: 7 - Operational Systems Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

F. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3080			Budget Activity: 1			Program Title: Intelligence Comm Equirpment		
27,775	10,408	12,535	11,325	12,291	16,732	17,522	Continues	TBD

G. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305160F
PE Title: Defense Meteorological Satellite Program (DMSP)

Project Number: 0001
Budget Activity: #7, Operational Systems Development
Old Budget Activity: #6, Defense-Wide Mission Support

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
DMSP 21,938	25,709	*21,135	21,722	19,678	21,188	22,350	Cont	TBD

*Note: Starting in FY95, DMSP Block 6 RDT&E funds are found in PE #0603434F, a new PE. DMSP Block 6 funds have been separated out into a single PE to distinguish between the current DMSP program and the follow-on program.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Defense Meteorological Satellite Program (DMSP) is a fully operational Joint-Service program which supports all military services. Operational commanders require timely, quality weather information to effectively employ weapon systems and protect DOD resources. DMSP is the DOD's most important source of global weather data. It provides visible and infrared cloud cover imagery (1/3 nm constant resolution) and other meteorological, oceanographic, and solar-geophysical information. These data are required over the entire earth in support of strategic and tactical operations. At least two satellites are required in sun synchronous 450nm polar orbit at all times (sun synchronous means the satellites cross the equator at the same local sun time on each of their 14 orbits/day). DMSP operational systems development supports the current operational DMSP program.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) Continued system integration and test, calibration, and validation and related support activities. ($12.2M)
   - (U) Continued Mark IVB ground terminal production. ($4.9M)
   - (U) Continued using the Block 6 contracts to assess system capabilities, operational impacts, and to develop cost models for a DOD/DOC merged national weather satellite system. ($4.8M)

2. (U) FY 1994 Planned Program:
   - (U) Continue system integration and test, calibration, and validation and related support activities. ($14.0M)
   - (U) Mark IVB pre-planned product improvement. ($1.5M)
   - (U) Continue using the Block 6 contracts to assess system capabilities, operational impacts, and to develop cost models for a DOD/DOC merged national weather satellite system. ($5.2M)
   - (U) Ensure readiness to transition to Titan II launch vehicle. ($0.2M)
   - (U) Small Tactical Terminal (STT) Operational Design Demonstration. ($4.6M)

Program Element: #0305160F
PE Title: Defense Meteorological Satellite Program (DMSP)

Project Number: 0001
Budget Activity: #7, Operations Systems Development
Old Budget Activity: #6, Defense-Wide Mission Support

Date: February 1994

3 (U) FY 1995 Planned Program:
- (U) Continue system integration and test, calibration, and validation and related support activities. ($16.9M)
- (U) STT IOT&E. ($2.2M)
- (U) Begin Mark IVB enhanced algorithm integration effort. ($2.0M)

4. (U) Program To Completion:
- (U) Continue system integration and test, calibration, and validation and related support activities.
- (U) Complete Mark IVB and STT enhanced algorithm development and implementation.
- (U) This is a continuing program.

D. (U) WORK PERFORMED BY: Development and procurement are managed by AFMC's Space and Missile Systems Center, Los Angeles AFB CA. Contractors include: Martin Marietta Astro Space Division, East Windsor, NJ (spacecraft and satellite integration); Westinghouse Electric Corp, Baltimore, MD (primary cloud imaging sensor); Aerojet Electro-system, Azusa, CA (microwave sounders and imagers); Harris Corp, Melbourne, FL (ground systems); and Lockheed Missiles and Space Company, Austin, TX (ground systems)

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2 (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: Block 6 funds and program details found in PE #0603434F starting in FY95.

F. (U) PROGRAM DOCUMENTATION :

- (U) Agreement between DOC, NASA, and DOD concerning polar operational meteorological satellite systems.
- (U) Joint-Service MOA (USAF/USN/USA/DOD), 15 Dec 76.
- (U) USAF SON 508-78, 28 Dec 78.
- (U) USAF SON 01-83, 17 mar 83.
- (U) JCS Requirements Memorandum 154-86, 1 Aug 86.
- (U) USAF SON 02-80, 14 Feb 86.
- (U) TEMP, 19 Apr 91.
- (U) USAF SON 505-79, 8 Sep 88.
- (U) ORD, 27 Dec 93.
- (U) AFSPACECOM MNS 020-91, Environmental Sensing, 6 Jan 93.

Program Element: #0305160F
PE Title: Defense Meteorological Satellite Program (DMSP)
Project Number: 0001
Budget Activity: #7, Operations Systems Development
Old Budget Activity: #6, Defense-Wide Mission Support
Date: February 1994

G. (U) RELATED ACTIVITIES:

- (U) DMSP is a Joint-Service program in accordance with the MOA. The Air Force is the Executive Agent with responsibility for the Space, C3, and Air Force User Segments. Each Service funds its own user Segment and any Service-unique changes to other segments.
- (U) Close coordination is maintained with the civilian weather satellite programs of the DOC. The DOD and DOC systems have different missions and sensors. Interchange of technology and joint efforts have been continuous with special emphasis on spacecraft bus commonality and avoiding duplication of effort. Efforts are underway to assess feasibility of consoildating DOD/DOC and NASA requirements as part of Block 6 efforts.
- (U) PE #0305160N, DMSP, provides funds for joint microwave imager procurement.
- (U) PE #0305162F, DMSP Communications.
- (U) Navy and Army provide funds for service specific Block 6 studies.
- (U) There is no unnecessary duplication of effort within the Air Force or the DOD.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3020; Budget Activity 5 ; Program Title DMSP								
30,950	27,705	29,159	29,458	28,447	29,559	30,712	Cont	TBD
FY93 Actual	**FY94 Estimate**	**FY95 Estimate**	**FY96 Estimate**	**FY97 Estimate**	**FY98 Estimate**	**FY99 Estimate**	**To Complete**	**Total Program**
Appropriation 3080; Budget Activity 3 ; Program Title DMSP								
16,755	26,434	22,494	19,290	15,875	21,198	15,534	Cont	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

Program Element: #0305160F
PE Title: Defense Meteorological Satellite Program (DMSP)

Project Number: 0001
Budget Activity: #7. Operations Systems Development
Old Budget Activity: #6. Defense-Wide Mission Support

Date: February 1994

J. (U) MILESTONE SCHEDULE:

1. Small Tactical Terminal (STT) Fly-off Testing	Apr 94
2. Small Tactical Terminal (STT) Production Phase	Jul 94
3. Spacecraft Delivery Schedule (S16-S20)	
a. S16	Sep/95
b. S17	Feb/96
c. S18	Dec/96
d. S19	Jun/97
e. S20	Jun/98

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305164F
PE Title: Navstar Global Positioning System (GPS) User Equipment

Project: 3028 Date: February 1994
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communications Systems

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

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Popular Name: Global Positioning System User Equipment								
20,784	16,073	9,781	10,669	10,519	10,702	10,933	Cont	Cont

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program element funds Research and Development to integrate Navstar Global Positioning System (GPS) user equipment into Air Force airborne and ground platforms. Military forces need precise location data to enhance command and control and to engage in strategic and tactical warfare. The GPS satisfies these requirements and improves target mapping, the probability of target acquisition, flexible routing, low-level ingress/egress, and accuracy of weapons delivery. GPS is a space based navigation system which provides highly accurate position, velocity and time. GPS consists of three segments. The space segment (funded in PE 0305165F) is the satellite constellation which provides the worldwide navigation signals. The control segment (also funded in PE 0305165F) measures and corrects satellite performance parameters and provides a user interface to the system. The user equipment (UE) segment consists of the electronic equipment and interfaces necessary to receive and process GPS satellite signals into position, velocity and time data for its various military uses. Navstar GPS is the largest avionics modification program in the DoD today.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Continued integration studies ($2,810)
   - (U) Continued technical support for aircraft integrations ($976)
   - (U) Continued IV&V on platform integrations and on UE software. ($750)

Program Element: #0305164F
PE Title: Navstar Global Positioning System (GPS) User Equipment

Project: 3028 Date: February 1994
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communications Systems

- (U) Continued development of the Miniaturized Airborne GPS receiver (MAGR) ($3,701)
- (U) Continued development of the Digital Analog Computer (DAC) ($200)
- (U) Initiated software block upgrade for the standard 5-channel GPS airborne receiver. ($2,014)
- (U) Conducted product improvement studies for the Embedded GPS Receiver (EGR), Space-Based Receiver (SBR), Advanced GPS Receiver (AGR), anti-jam technologies, GPS enhancements for Combat Search and Rescue (CSAR) equipment, differential GPS, precision approach, and integrity. ($3,020)
- (U) Continued development and product improvement testing for GPS user equipment ($1,200)
- (U) Continued support contracts ($1,871)
- (U) Continued In-House support ($4,242)

2. (U) FY 1994 Planned Program:
- (U) Continue Integration studies ($3,052)
- (U) Continue to support development testing for aircraft integrations.($1,221)
- (U) Continue development of Miniaturized Airborne GPS Receiver (MAGR) ($520)
- (U) Continue developing software block upgrade for 5-channel GPS airborne receiver ($700)
- (U) Continue IV&V on platform integrations and on UE software. ($832)
- (U) Continue product improvement studies for EGR, SBR, AGR, anti-jam, GPS upgrades for CSAR equipment, differential GPS, precision approach, integrity and Selective Availability and Anti-Spoofing Module (SAASM). ($4,229)
- (U) Complete development of Digital Analog Computer ($50)
- (U) Continue development and product improvement testing for user equipment ($1,226)
- (U) Continue support contracts ($1,968)
- (U) Continue In-House support ($2,275)

3. (U) FY 1995 Planned Program:
- (U) Continue Integration studies ($98)

Program Element: #0305164F
PE Title: Navstar Global Positioning System (GPS) User Equipment

Project: 3028 Date: February 1994
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communications Systems

- (U) Continue technical support for aircraft integration. ($857)
- (U) Continue IV&V on platform integrations and on UE software. ($620)
- (U) Continue product improvement studies for EGR, SBR, AGR, anti-jam, GPS upgrades for CSAR equipment, differential GPS, precision approach, integrity and SAASM. ($3,308)
- (U) Continue development and product improvement testing for user equipment ($1,260)
- (U) Continue support contracts ($1,601)
- (U) Continue In-House support ($2,037)

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

D. (U) WORK PERFORMED BY: The acquisition of GPS is managed by a Joint Program Office located at the Air Force Material Command's Space and Missile Systems Center, Los Angeles AFB, CA. User equipment is produced by Rockwell International, Collins Avionics and Communications Division, Cedar Rapids, IA; Quantic Industries Inc, San Carlos CA; E-Systems, Clearwater FL; Trimble Navigation Inc, Sunnyvale, CA; and SCI, Huntsville, AL. Intermetrics, Cambridge, MA, is the user equipment software independent verification/validation contractor. Holloman Air Force Base (AFB) and Army Electronic Proving Ground (EPC) Yuma, AZ provide technical support to the program for UE testing. The Joint Service Systems Management Office (JSSMO) located at Robins AFB provides technical support to the program for the development of the Integrated Support Facility. The Air Force Wright Laboratory at Wright Patterson AFB and Eglin AFB provide advanced technology support to the program. The Naval Research and Development Center, Warminster, PA and the Naval Air Warfare Center Indianapolis, IN, are providing technical and validation support to the program office for joint service user equipment development and production.

Program Element: #0305164F
PE Title: Navstar Global Positioning System (GPS) User Equipment

Project: 3028 Date: February 1994
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communications Systems

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:

- (U) Acquisition Decision Memorandum, January 1992.
- (U) Integrated Program Assessment, January 1992.
- (U) Integrated Program Summary, December 1991.
- (U) Integrated Multi-Service Test and Evaluation Master Plan, October 1991.
- (U) System Operational Requirements Document, January 1990.
- (U) Navstar GPS Baseline, 22 December 1989.

G. (U) RELATED ACTIVITIES:

- (U) GPS development and operational implementation are joint activities. AF is Executive Agent and develops, procures, and operates space and control segments. Services jointly develop and procure user equipment through the Joint Program Office.
- (U) Other agencies are the Army, Navy, Marine Corps, Defense Mapping Agency, Dept of Transportation, North Atlantic Treaty Organization (NATO), and Australia.
- (U) Coordination obtained through a Joint Program Office.
- (U) PE 0603601F, Conventional Weapon Technology.
- (U) PE 0305165F, Navstar GPS (Space/Ground).
- (U) PE 0101221N, Fleet Ballistic Missile Systems, range positioning.

Program Element: #0305164F
PE Title: Navstar Global Positioning System (GPS) User Equipment

Project: 3028 Date: February 1994
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communications Systems

- (U) PE 0301357F and 0305913F, Nuclear Detonation Detection System (NDS),
- (U) PE 0305119F, Medium Launch Vehicles.
- (U) PE 0305130F, Consolidated Space Operations Center (CSOC).
- (U) There is no unnecessary duplication of effort within the AF or the DoD.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Appropriation 3010 (BP 11), Budget Activity 7 Operational Systems Development, Program Title: GPS User Equipment								
4,194	0	0	0	0	0	0	Cont	Cont

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Appropriation 3010 (BP 12), Budget Activity 7 Operational Systems Development, Program Title: GPS User Equipment								
398	0	0	0	0	0	0	Cont	Cont

Program Element: #0305164F
PE Title: Navstar Global Positioning System (GPS) User Equipment

Project: 3028
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communications Systems

Date: February 1994

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Appropriation 3010 (BP 16), Budget Activity 7 Operational Systems Development, Program Title: GPS User Equipment								
6,672	2,013	1,794	937	1,089	1,124	1,169	Cont	Cont
FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Appropriation 3010 (BP 19), Budget Activity 7 Operational Systems Development, Program Title: GPS User Equipment								
82,601	67,753	70,674	61,623	75,296	77,922	80,634	Cont	Cont
FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Appropriation 3080 (BA 83/84), Budget Activity 7 Operational Systems Development, Program Title: GPS User Equipment								
7,396	4,608	3,901	3,190	3,379	3,454	3,545	Cont	Cont
Qty 2,612	1,671	795	513	489	537	591		

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: In April, 1978, a Memo of Understanding (MOU) was signed with 9 NATO allies and with Australia to permit NATO and Australian participation in developing GPS user equipment. The MOU created an international team at the US Joint Program Office (JPO). Nations involved included UK, Norway, the Netherlands, Italy, Germany,

Program Element: #0305164F
PE Title: Navstar Global Positioning System (GPS) User Equipment

Project: 3028 Date: February 1994
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communications Systems

France, Denmark, Canada, Belgium, and Australia. In 1987 Spain became the 10th NATO signatory to the MOU. In 1991, Australia signed an agreement for 20 years in duration that allows access to PPS and the purchase of production UE. In 1991, a new NATO MOU added Portugal, Turkey, and Greece. This MOU will expire at the end of 1993. A new MOU with the duration of 20 years is under negotiation with NATO countries to cover the operational phase of GPS: access to PPS, security of PPS and development, production and marketing of PPS UE.

J. (U) MILESTONE SCHEDULE:

Full rate UE production	Nov 93
PLGR QT&E	Sep 92-Dec 93
PLGR QOT&E	Oct 93- Jan 94
MAGR FOT&E	FY94
PLGR FOT&E	FY95

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305165F
PE Title: Navstar Global Positioning (GPS) Space/Control

Project: 3030
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communication System

Date: February 1994

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

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	Total Complete	Total Program
56,222	38,808	51,125	37,910	21,085	21,727	22,498	Cont	Cont

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program element funds Research and Development for the Navstar Global Positioning System (GPS) space and control segments of the overall GPS program. This includes: satellite development, procurement, deployment, training simulators, Mission Operation Support Center (MOSC), and operation of the ground control segment; including sustaining engineering; upgrades to the space and ground segments; and R&D efforts to support deployment of the entire GPS system.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
- (U) Completed Operate Through negotiations and contract modifications ($20,586)
- (U) Delivered first major ground control segment software upgrade (OR 5.30) to AFSPACECOM ($6,111)
- (U) Completed Preliminary Design Review for Operational Release 5.40 ($6,455)
- (U) Delivered upgrade mainframe computers (ES/9000) to the ground control segment to support the Block IIR satellites ($3,233)
- (U) Continued joint program office GPS support ($5,500)
- (U) Continued Block IIR software development, completed preliminary design review and critical design review ($12,100)
- (U) Completed Critical Design Review for Block IIR satellites ($2,237)

Program Element: #0305165F
PE Title: Navstar Global Positioning (GPS) Space/Control

Project: 3030
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communication System

Date: February 1994

2. (U) FY 1994 Planned Program:
- (U) Deliver second major ground control segment software upgrade (OR 5.4) to AFSPACECOM ($6,235)
- (U) Continue Block IIR software development ($21,624)
- (U) Continue upgrade of ES9000 ($4,345)
- (U) Continue joint program office GPS support ($6,604)

3. (U) FY 1995 Planned Program:
- (U) Continue Block IIR software development and deliver launch critical Block IIR ground software to AFSPACECOM ($23,716)
- (U) Begin development of training simulator ($7,300)
- (U) Continue sustaining engineering development ($4,857)
- (U) Begin development of Mission Operation Support Center software ($4,300)
- (U) Continue upgrade of ES9000 ($319)
- (U) Continue joint program office GPS support ($10,613)
- (U) Conduct integration studies to determine feasibility of incorporating auxiliary payloads on present and future GPS satellites, including payloads supporting Combat Survivor Evader Locator (CSEL) communications capabilities ($10)
- (U) Pending results of integration studies and Milestone approval for CSEL, initiate development of satellite modifications to incorporate CSEL capabilities on GPS satellites ($10)

Program Element: #0305165F
PE Title: Navstar Global Positioning (GPS) Space/Control

Project: 3030
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communication System

Date: February 1994

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

D. (U) Work Performed By:
The acquisition of GPS is managed by a Joint Program Office under the DAC, SMC/CC, located at Los Angeles AFB, CA. The Block II satellite contractor is Rockwell International, Seal Beach, CA. The Block IIR satellite contractor is Martin Marietta, Valley Forge, PA. Operational Control Segment development and deployment is being done by Federal Systems Group, The Loral Corp., Gaithersburg, MD.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Block IIR software was functionally split into launch critical and full mission capable software deliveries to allow the Operational Control Segment (OCS) to support the March 1996 Block IIR launch date. This split was required to accommodate satellite design changes, data dependencies, and test asset availability.

2. (U) SCHEDULE CHANGES: An incremental development approach was implemented to mitigate OCS Block IIR software schedule risk. This approach utilizes incremental design packages and a concurrent test methodology. Block IIR launch critical software is on schedule. Remaining Block IIR functions will be delivered on schedule determined by AFSPACECOM and AFMC.

3. (U) COST CHANGES: None.

Program Element: #0305165F
PE Title: Navstar Global Positioning (GPS) Space/Control

Project: 3030
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communication System

Date: February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) Decision Coordinating Paper 133 (Rev A), 17 Jan 78.
- (U) System Operational Requirements Document, January 1990.

G. (U) RELATED ACTIVITIES:

- (U) GPS development and operational implementation are joint activities. Air Force is Executive Agent. Air Force develops, procures, and operates space and control segments. Services jointly develop and procure user equipment through the Joint Program Office.
- (U) Other agencies are the Army, Navy, Marine Corps, Defense Mapping Agency, Department of Transportation, North Atlantic Treaty Organization (NATO), and Australia.
- (U) Coordination obtained through a Joint Program Office.
- (U) PE 0305164F, Navstar GPS (User Equipment), provides receivers to use the positioning, navigation and timing signals from satellites.
- (U) PE 0101221N, Fleet Ballistic Missile Systems, range positioning.
- (U) PE 0301357F and 0305913F (formerly 0102433F), Nuclear Detonation Detection System (NDS), fund NDS payloads on the GPS satellites.
- (U) PE 0305119F Space Boosters, funds launch services (Delta II).
- (U) PE 0305130F, Consolidated Space Operations Center (CSOC), funds CSOC which hosts the operational GPS Master Control Station.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0305165F
PE Title: Navstar Global Positioning (GPS) Space/Control

Project: 3030
Budget Activity: 7 Operational Systems Development
Old Budget Activity: 5-Intelligence and Communication System

Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

- (U) Weapons Procurement (BA 5, Weapon System GPS):

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
175,616	166,587	190,183	120,155	145,973	284,205	373,311	Cont	Cont

- (U) Other Procurement (BA 83) including initial spares:

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
5,849	2,328	5,244	1,046	1,212	3,394	7,731	Cont	Cont

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

System IOC (RAA)	4Q FY93
Control Segment Phase III IOT&E	3Q FY94
System FOC	2Q FY95
First Block IIR Launch	3Q FY96

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #035182F
PE Title: Eastern Range

Project Number: 4137
Budget Activity: #7 - Operatio. ystems Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

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

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Range Standardization and Automation (RSA)								
0	50,955	42,710	52,573	38,109	38,806	40,887	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:

The Eastern and Western Ranges provide tracking, telemetry, communications, command/control and other support capabilities necessary to safely and successfully conduct civil, commercial, and national security spacelift operations, ballistic missile test and evaluation (T&E), and a variety of aeronautical and guided weapons T&E. Range assets are based on 1950s/1960s designs and technology, and are arrayed in a highly inefficient, manpower intensive architecture. Range instrumentation has deteriorating reliabilities and over 40% of the components are obsolete with no sources for support. The ranges do not provide the responsiveness and flexibility critical to affordably support the nation's spacelift needs. Replacement of the aging systems is a necessity. RSA completely overhauls and modernizes both the Eastern Range (ER) and Western Range (WR). The overriding philosophy of the program is to treat the two ranges as a single integrated range system with an Eastern and Western segment. RSA will develop the integrated range system, using remote control and automation techniques to reduce the number of required operators, sites, and facilities, and to produce improved responsiveness. The result will be a range system reconfigurable from launch to launch in less than 6 hours versus 2-3 days, capable of being operated for 20% less than current ranges, and supportable through existing Air Force logistics infrastructure and standard practices. RSA is critical to the future of the spacelift ranges; performance and cost goals cannot be achieved without RSA. The Congressionally directed Dual Use Launch Facility Grant Program is also included in this Program Element. Research category is 6.7; development of new range systems is necessary to ensure continuation of the nation's spacelift capability.

Program Element: #035182F
PE Title: Eastern Range

Project Number: 4137
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program: Not Applicable.

2. (U) FY 1994 Planned Program

- (U) Complete Range Operations Control Center (ROCC) activation - Apr 94. ($11.1M)
- (U) Complete system architecture design for a consolidated instrumentation system including the Consolidated Instrumentation Facility (CIF) and Unified Tracking Antenna (UTA) concepts for Antigua and Ascension tracking sites by Feb 94. Begin design/development of CIF/UTA for Antigua. Reduces infrastructure required at each island from four sites to one and reduces required operators and maintainers by over 30%. Design, develop and acquire communications upgrades at Cape Canaveral AFS (CCAFS) and a satellite communications network to link downrange stations at Antigua and Ascension with the Range Control Center at CCAFS. Complete, by Sep 94, Eastern Range/Western Range system architecture design for mainland (Air Force sites at Cape Canaveral AFS, Kennedy Space Center, Jonathan Dickinson Missile Tracking Annex, Vandenberg AFB, Pillar Point AFS) instrumentation, weather, surveillance and optical subsystems, including the Central Telemetry Processing System (CTPS), which enables real time command/control and launch vehicle data processing, and replaces and consolidates various obsolete processing systems now in use. Produce design necessary to provide required national spacelift operations capability with a smaller, more responsive, less costly range system. ($23.7M)

- (U) Develop and design a range simulator and Meteorological Support Subsystems for both ranges. ($6.1M)
- (U) Complete the Congressionally directed Dual Use Launch Facility Grant Program. ($10.0M)

Program Element: #035182F
PE Title: Eastern Range

Project Number: 4137
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

3. (U) FY 1995 Planned Program
- (U) Complete CIF/UTA design for Antigua and initiate development of range instrumentation for Ascension. ($24.5M)
- (U) Begin development and design of an ROCC for the Western Range. Continue design of mainland range instrumentation (Telemetry, Metric and Command Subsystems) based on architecture developed for the remote sites at Antigua and Ascension. Initiate development and procurement of weather, surveillance, telemetry processing, centralized data processing and optical systems. Develop prototype systems for evaluation. These systems will replace existing systems which are unreliable and becoming unsupportable, with standard systems that can be operated and maintained the same way at both ranges. ($11.2M)
- (U) Select and prototype candidate GPS receiver equipment for on-board processing and downlink of position data to support range safety functions, for flight test in FY96 on launches of opportunity. ($7.0M)

4. (U) Program to Completion
- (U) Complete upgrade of the Antigua and Ascension tracking sites.
- (U) Complete development, qualification and integration of weather, surveillance, optical and other range systems.
- (U) Complete design, development and integration of consolidated data processing and range command/control capabilities, and conduct total system test and evaluation.

D. (U) WORK PERFORMED BY: The contractor for the RSA design, development and installation effort for Antigua and Ascension sites is Harris Corp., Melbourne, FL. Portions of the FY94 design work will be accomplished through existing range and Aerospace contracts and DOD laboratories. The remainder of the effort will be accomplished through competitively awarded contracts and options to the Harris Corp. contract. In-house development organization is Space and Missile Systems Center, Los Angeles AFB, CA.

Program Element: #035182F
PE Title: Eastern Range

Project Number: 4137
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) Technical changes: None
2. (U) Schedule changes: None
3. (U) Cost changes: None

F. (U) PROGRAM DOCUMENTATION:
- Air Force Space Command Mission Need Statement 022-91, 21 October 1992

G. (U) RELATED ACTIVITIES:
- (U) PE #035181F, Western Range. The designs developed for RSA will also be applied to the Western Range.
- (U) Military Construction funds used to construct new buildings to house the new RSA equipment are in PE #78022F.
- (U) There is no unnecessary duplication of effort within the AF or the DoD.

Program Element: #035182F
PE Title: Eastern Range

Project Number: 4137
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Actual	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation: Other Procurement, Budget Activity: #6, Defense Wide Mission Support, Program Title: Range Standardization and Automation/Improvement and Modernization*								
58,339	87,816	92,507	82,367	97,055	94,494	57,800	Continuing	Continuing

* Includes funds required for range sustaining improvement and modernization.

Appropriation: Missile Procurement, Budget Activity: #6, Defense Wide Mission Support, Program Title: Weather Rockets*								
0	0	724	730	764	782	805	Continuing	Continuing

* Used to purchase weather sounding rockets. Other Procurement funds were used prior to FY95.

Appropriation: Military Construction, Budget Activity: #6, Defense Wide Mission Support, Program Title: Range Facilities*								
0	7,600	1,750	300	0	0	0	0	9,350

* PE #35182F MILCON funds are associated with non-RSA range facilities.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The Antigua and Ascension sites are operated under agreements with foreign governments. The Antigua site land is leased from the Government of Antigua. The Ascension site land is used under agreements with the United Kingdom dating back originally to the Lend Lease agreements of 1940.

Program Element: #035182F
PE Title: Eastern Range

Project Number: 4137
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

J. (U) MILESTONE SCHEDULE:

1. RSA Phase 1 Contract Award	June 1993
2. Complete RSA System Architecture Design	September 1994
3. RSA Phase 2 Contract Award	FY95
4. Complete Cape Communications Upgrades	1 Qtr FY 1996
5. Complete Western Range CTPS	2 Qtr FY 1996
6. Complete Antigua site	2 Qtr FY 1996
7. Complete Ascension site	1 Qtr FY 1997
8. Complete Eastern Range CTPS	2 Qtr FY 1997
9. Complete Eastern Range Implementation	4 Qtr FY 1999
10. Complete Western Range Implementation	FY 2003

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305887F **Date: February 1994**
PE Title: Electronic Combat Intelligence Support
Budget Activity: 7. Operational Systems Development
Old Budget Activity: 4. Tactical Programs

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2907 Electronic Combat (EC) Intelligence Support								
1,790	1,993						Cont.	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This funding is required to support Foreign Materiel Exploitation Operational Test and Evaluation (FMOT&E). This requirement supports the demonstration and validation category (6.3B). FMOT&E funding ensures the ability of operational commands to test and develop effective Electronic Attack/Electronic Protection (EA/EP) and tactics against actual, current and potential threats. Funds are required for: deployment of blue systems to test facilities, travel for personnel to the test sites to evaluate and validate test results real-time, reimbursement for industrial-funded range & laboratory costs; costs for instrumentation of blue systems; contracted engineering support for the conduct of tests and subsequent reporting. Funding for this program is required to prevent future aircraft losses due to improper and inaccurate air crew training (e.g. lack of evasive action or proper tactics training to avoid missile attack).

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995 :

1. (U) Project 2907, Electronic Combat Intelligence Support: FMOT&E funding ensures the ability to test and develop effective Electronic Attack/Electronic Protection (EA/EP) and tactics against real and potential threats.

Program Element: #0305887F
PE Title: Electronic Combat Intelligence Support
Budget Activity: 7. Operational Systems Development
Old Budget Activity: 4. Tactical Programs

Date: February 1994

(U) FY 1993 Accomplishments:

(U) - Testing against the following weapons systems

(300K)
(500K)
(990K)

(U) - Participants were ACC, AFSOC, AMC and AFMC

(U) - The success of these tests led to changes to major U.S. weapons systems/avionics/tactics

(U) FY 1994 Plans:

(U) - Testing against the following weapon systems:

(100K)
(180K)
(194K)
(333K)
(180K)
(150K)
(147K)
(310K)
(399K)

(U) - Extensive evaluations and reporting to be accomplished

(U) FY 1995 Plans:

(U) - Testing against the following systems:

Program Element: #0305887F
PE Title: Electronic Combat Intelligence Support
Budget Activity: 7. Operational Systems Development
Old Budget Activity: 4. Tactical Programs

Date: February 1994

(U) Work Performed By: HQ Air Combat Command, HQ Air Force Materiel Command, HQ Air Force Special Operations Command, HQ Air Mobility Command, HQ Air Force Operational Test and Evaluation Center and their subordinate units

(U) Related Activities: Not applicable.

(U) Other Appropriation Funds ($ In Thousands): Not applicable.

(U) International Cooperative Agreements: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305905F
PE Title: Improved Space-Based TW/AA System (ISBTW/AA)
Budget Activity: 7-Operational Systems Development
Old Budget Activity: 3 - Strategic Programs

DATE: February 1994

A. (U) RESOURCES ($ in Thousands)*:

FY93 Act	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
236,557	107,378	0	0	0	0	0	N/A*	N/A*

* FEWS program terminated in FY94

B. (U) BRIEF DESCRIPTION OF ELEMENT: The purpose of the ISBTW/AA program (also known as the Follow-on Early Warning System or FEWS) is to select and develop a satellite which provides increased performance over the existing Defense Support Program (DSP-1) satellite. The ISBTW/AA spacecraft primary mission is to provide initial warning of a ballistic missile attack on the US. The ISBTW/AA satellite will incorporate new technologies that would enhance detection and provide direct reporting of ICBM/SLBM launches and improve space based surveillance of tactical ballistic missile launches worldwide. This program consists of two parts: a Space Segment (SS), and a Ground Segment (GS), which includes fixed and mobile elements. This program is in the operational systems development research category, originally scheduled for a Milestone II review in Jun 94.

Program Element: #0305905F
PE Title: Improved Space-Based TW/AA System (ISBTW/AA)
Budget Activity: 7-Operational Systems Development
Old Budget Activity: 3 - Strategic Programs

DATE: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY95:

1. ISB TW/AA (also known as FEWS):

(U) FY 1993 Accomplishments:
- (U) Continued Dem/Val phase contracts.
- (U) Technology Producibility Assessment Review (TPAR) to determine producibility of critical, risk technologies in four areas - optics, focal plane, communications, and data processing.
- (U) Intensive development of flight-like software code.
- (U) Fabricate and test critical optics components using state-of-the-art null lens techniques.
- (U) Defined requirements for and design on-board data processing.
- (U) Conducted Ground-based testing of the telescope system.
- (U) DAB Program Review.

(U) FY 1994 Planned Program:
- (U) DepSecDef issued PDM canceling FEWS in Nov 93
- (U) Program office issued Stop work order on current Dem Val contracts (11/15/93)
- (U) Contractors Stop all work (12/31/93)
- (U) Terminate FEWS contracts (Scheduled for Feb/Mar 94 following congressional notification)

(U) FY 1995 Planned Program:
(U) N/A - This program will be terminated in FY94

(U) Program to Completion:
(U) N/A - This program will be terminated in FY94

Program Element: #0305905F
PE Title: Improved Space-Based TW/AA System (ISBTW/AA)
Budget Activity: 7-Operational Systems Development
Old Budget Activity: 3 - Strategic Programs

DATE: February 1994

(U) Work Performed By:
Work during FY1992 through 1994 for ISBTW/AA Dem/Val phase is being performed by Lockheed Missiles and Space Company, Sunnyvale, CA and TRW Incorporated, Redondo Beach, CA. This effort is managed by the Space Based Early Warning Systems program office, Space and Missile Systems Center, Los Angeles AFB, Ca. The program office receives technical assistance from the Aerospace Corporation.

(U) RELATED ACTIVITIES:
- (U) PE #0102431F (Defense Support Program).
- (U) PE #0305911F (Space Activities).
- (U) PE #0603425F (Follow-on Early Warning System).
- (U) PE #0305144F/0305171F (Titan Space Boosters/Space Launch Support).
- (U) PE #0102310F/0102313F (Cheyenne Mountain Upgrade Programs/Integrated TW/AA System).
- (U) PE #0305110F/0305151F (AF Satellite Control Network).
- (U) PE #0912011F (Construction Planning and Design).
- (U) PE #0603441F (Advanced Space Based TW/AA - Dem/Val)
- (U) PE #0604441F (Advanced Space Based TW/AA - EMD)
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

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

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305906F
PE Title: NCMC - TW/AA Systems
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3880 Cheyenne Mountain Upgrade (CMU)								
143,591	122,707	86,808	33,172	661	0	0	0	1,282,225
3881 Integrated TW/AA System								
10.284	10.280	13.712	11.262	5.790	5.401	4.633	Cont	TBD
Total								
153,875	132,987	100,520	44,434	6,451	5,401	4,633	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element funds the replacement systems for the Integrated Tactical Warning/Attack Assessment (TW/AA) network's command, control, and communications (C3) functions within the Cheyenne Mountain Complex (CMC) and at selected forward users. This replacement program is designed to incrementally upgrade and replace the current operational systems without loss of attack warning capability during the phased transition. The Integrated TW/AA architecture must respond to a flexible, coordinated (missile, air, and space) attack threat. The program has two related projects: The first, CMU's six system acquisitions are one project, which is supported by the second project--Integrated TW/AA System Engineering. The second project provides interface analysis and disconnect resolution between CMU and over twenty other Integrated TW/AA systems and program upgrades. Together these two projects will insure the Commanders-in-Chief, United States Space Command (USCINCSPACE) and North American Aerospace Defense Command (CINCNORAD), other nuclear-capable CINCs, the Chairman of the Joint Chiefs of Staff, and the National Command Authorities of the US and Canada will have the timely, reliable, and unambiguous attack warning and assessment data required to meet national security needs into the next century. This is research category 6.7.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems
Project Number: 3881
Budget Activity: #7- Operational Systems Support
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3881 Integrated TW/AA System								
10,284	10,280	13,712	11,262	5,790	5,401	4,633	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project was set up in 1989 when Air Force recognized the phased transition of Cheyenne Mountain Upgrade (CMU) program into the Integrated Tactical Warning/Assessment (TW/AA) network could only be achieved through rigorous system-of-systems design and engineering analysis of all interfaces and relationships among the twenty-six systems of the network. This project provides for interface analysis and disconnect resolution between CMU and over twenty other Integrated TW/AA systems and program upgrades as required to support the Integrated TW/AA network's continually evolving system-of-systems (e.g., Improved Space-based TW/AA System) and changes driven by new missions/threats (e.g., National Missile Defense).

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   (U) - Provided systems engineering and integration support between CMU systems and the Integrated TW/AA network. Analyzed and resolved test deficiencies from Communications System Segment Replacement (CSSR) interface testing with CMU & Integrated TW/AA systems. ($10,284)

2. (U) FY 1994 Planned Program:
   (U) - Provide systems engineering support during Development Test and Evaluation (DT&E)/Operational T&E (OT&E) for CMU major system deliveries. ($10,280)

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems
Project Number: 3881
Budget Activity: #7- Operational Systems Support
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

3. (U) FY 1995 Planned Program:
   (U) - Provide systems engineering support during Development Test and Evaluation (DT&E)/Operational T&E (OT&E) for CMU major system deliveries. ($9,612)
   (U) - Continue Cheyenne Mt. Training System (CMTS) program currently funded by multiple PEs as discussed in Cost Change section below. ($4,100)

4. (U) Program to Completion:
   (U) - This is a continuing project, as described above, as long as integrated attack warning is required by the National Command Authorities. After Cheyenne Mountain Upgrade (CMU) Full Operational Capability (FOC), this project will continue to provide systems engineering support for integration of upgraded or new programs that interface with the Integrated Tactical Warning and Attack Assessment (TW/AA) network.

D. (U) WORK PERFORMED BY: This project is managed by Air Force Material Command's Electronic Systems Center (ESC) at Hanscom AFB, MA. ESC integrates the CMU systems and other Integrated Tactical Warning and Attack Assessment (TW/AA) systems into Cheyenne Mountain AFB, the Alternate Processing and Correlation Center (APCC) facility at Offutt AFB, NE, and selected other command centers. MITRE, Bedford, MA, and CTA, Colorado Springs, CO, provide technical engineering and system integration support to ESC.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: Apparent cost increase from FY94 to FY95-96 due to consolidation of Cheyenne Mountain Training System (CMTS) funds from multiple appropriations (3400/3600) and different Program Elements (0305110F, 0305130F and 0305907F).

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems
Project Number: 3881
Budget Activity: #7- Operational Systems Support
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

F. (U) PROGRAM DOCUMENTATION:

(U) - MCM 0050-93, Attack Information Requirements of the Chairman of the Joint Chiefs of Staff, 1 Apr 93 (S).
(U) - AFSPACECOM Systems Operational Requirements Document (SORD) 003-84-I/II/III for Cheyenne Mountain Upgrade (CMU) Program, revised 6 Mar 92 (S).
(U) - Program Management Directive 9247(5)/PE0305906F/0305907F, Cheyenne Mountain Complex (CMC), 10 Nov 93 (U).

G. (U) RELATED ACTIVITIES:

(U) - Program Element # 0305902F, Ballistic Missile Tactical Warning/Attack Assessment System.
(U) - Program Element # 0305904F, Space Defense Interface Network.
(U) - Program Element # 0305907F, NCMC - Space Defense Systems.
(U) - Program Element # 0305908F, TW/AA Interface Network.
(U) - Program Element # 0305909F, Ballistic Missile Early Warning System (BMEWS) Modernization.
(U) - Program Element # 0305911F, Defense Support Program (DSP).
(U) - Program Element # 0305912F, Sea-Launched Ballistic Missile (SLBM) Warning Radar Systems.
(U) - The Joint Potential Designator (JPD) does not apply.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: This is a sustaining engineering effort with no distinct milestones.

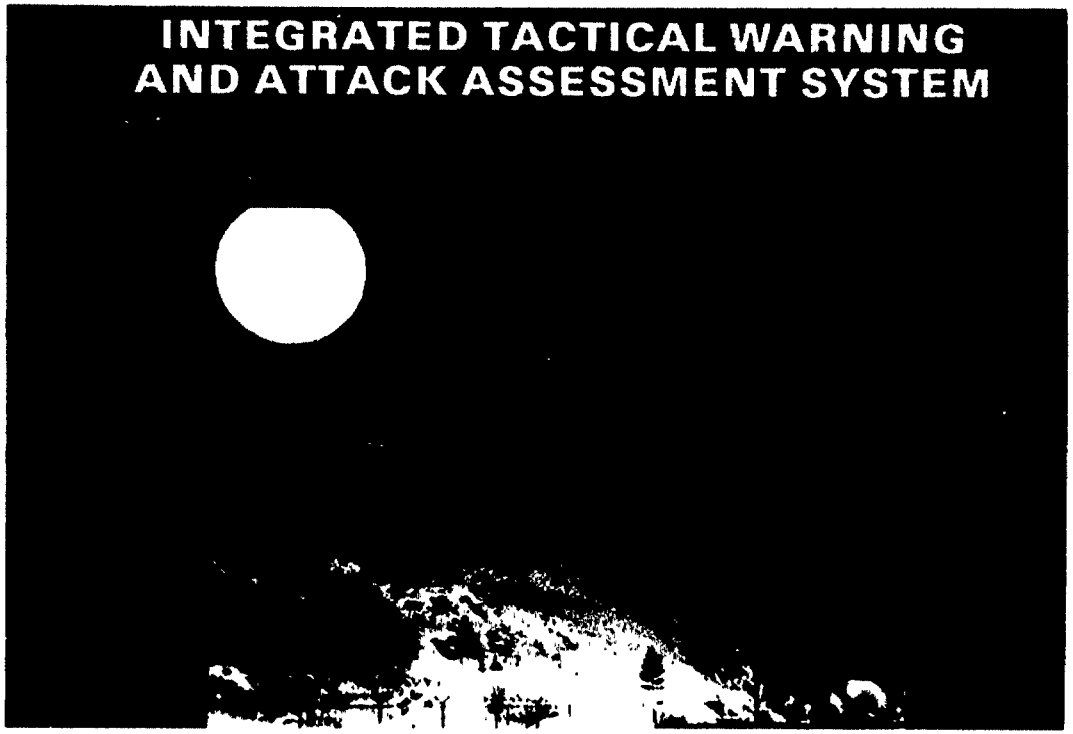
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems

Project Number: 3880
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

POPULAR NAME: Cheyenne Mountain Upgrade (CMU)



Program Element: #0305906F
PE Title: NCMC-TW/AA Systems
Project Number: 3880
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	None	- CSSR (BTC) Compl. 1/94 - CCPDS-R #1 IOC 03/94 - CSSR (APCC) IOC 09/94	- CCPDS-R #2/3 IOC 12/94 - SCIS I/C 06/95 - Granite Sentry IOC 06/95 - SPADOC 4 IOC 09/95	- SCIS IOC 11/95 - APCC IOC 02/95 - CMU FOC 12/95	Program Close-out			
Engineering Milestones	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
T&E Milestones		None	MW #1 04/94 MW #2 09/94	AW 12/95	SW	N/A		
Contract Milestones	Granite Sentry CA: 03/93	None	None	None	None	None	None	N/A
Budget ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**To Complete**
Major Contract	114,761	88,864	57,712	12,955	318			959,128
Support Contract	20,799	19,701	18,460	11,010	218			223,655
In-House Contract	7,431	13,599	9,495	6,967	125			89,091
GFE/Other	600	543	1,141	2,240	000			10,351
Total	143,591	122,707	86,808	33,172	661			1,282,225

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems
Project Number: 3880
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Cheyenne Mountain Upgrade (CMU) program must meet Joint Chiefs of Staff (JCS) requirements to provide the National Command Authorities with timely, reliable, and unambiguous Integrated Tactical Warning and Attack Assessment (TW/AA) data for force survival or retaliatory decisions in the face of air, space, or ballistic missile threats. The program has six system acquisitions to provide: 1) survivable communications access for missile attack warning, 2) integrated warning of ballistic missile, atmospheric, and space threats, 3) standard user displays and warning processing systems at selected command centers, and 4) an austere alternate facility capable of early/trans-attack warning correlation and peacetime backup to the North American Aerospace Defense (NORAD) command center at Cheyenne Mountain.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments
   - (U) - Command Center Processing & Display System-Replacement (CCPDS-R) Common Subsystem - conducted Development Test and Evaluation (DT&E) at Cheyenne Mountain. ($37,739)
   - (U) - Conducted Communications System Segment Replacement (CSSR), Survivable Communications Integration System (SCIS), Granite Sentry testing. ($73,410)
   - (U) - CSSR - began installation and checkout at the Alternate Processing and Correlation Center (APCC). ($4,862)
   - (U) - Delivered Space Defense Operations Center (SPADOC) 4C software Version 1 ($27,580)

2. (U) FY 1994 Planned Program
   - (U) - Conduct Missile Warning (MW) test #1 and CCPDS-R Common Subsystem achieve Initial Operations Capability (IOC) at Cheyenne Mountain. ($22,748)
   - (U) - Granite Sentry - deliver Cheyenne Mountain's NORAD Battle Staff Support Center (BSSC). Begin air warning/command center installation at APCC. ($31,208)
   - (U) - CSSR - conduct Granite Sentry/SPADOC 4C interface testing. Deliver CSSR subset to APCC and achieve Additional Operational Capability (AOC) #2 at APCC/Cheyenne Mountain. ($45,487)
   - (U) - SCIS - begin installation and checkout at 23 locations worldwide. ($23,264)

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems
Project Number: 3880
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

3. (U) FY 1995 Planned Program:
   - (U) - CCPDS-R achieve IOC at US Strategic Command (STRATCOM) and APCC. Granite Sentry begin Operational Test and Evaluation at APCC. Conduct MW test #2. ($16,738)
   - (U) - SPADOC 4C achieve IOC at Cheyenne Mountain. ($16,463)
   - (U) - Complete installation/checkout of all SCIS equipment. ($21,909)
   - (U) - Complete Granite Sentry DT&E and conduct Air Warning (AW) test. ($31,698)

4. (U) Program to Completion:
   - (U) - Continue correction of all significant deficiencies as required.

D. (U) WORK PERFORMED BY: CMU program is managed by Air Force Material Command's Electronic Systems Center (ESC), Hanscom AFB, MA. CMU prime contractors, by system, are 1) SCIS: E-Systems, St. Petersburg, FL; 2) CSSR: GTE, Needham, MA; 3) SPADOC 4C: LORAL C2 Systems, Colorado Springs, CO; 4) CCPDS-R: TRW, Redondo Beach, CA; 5) Granite Sentry: Martin Marietta, Colorado Springs, CO. ESC integrates delivery of Cheyenne Mountain Upgrade (CMU) systems to Alternate Processing and Correlation Center (APCC) facility at Offutt AFB, NE. MITRE, Bedford, MA, and CTA, Rockville, MD provide technical system engineering and integration support.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Air Force Program Executive Officer directed additional Development Test and Evaluation (DT&E) in operational environment to support revised Operational Test and Evaluation (OT&E) warning mission test concept.
2. (U) SCHEDULE CHANGES: Additional DT&E slipped start of first Missile Warning mission "string test" from Jun 93 to Oct 93.
3. (U) COST CHANGES: No significant changes.

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems
Project Number: 3880
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

F. (U) PROGRAM DOCUMENTATION:

(U) - MCM 0050-93, Attack Information Requirements of the Chairman of the Joint Chiefs of Staff, 1 Apr 93 (S).
(U) - AFSPACECOM Systems Operational Requirements Document (SORD) 003-84-I/II/III for Cheyenne Mountain Upgrade (CMU) Program, 6 Mar 92 (S).
(U) - Program Management Directive 9247(5)/PE10305906F/0305907F, Cheyenne Mountain Complex (CMC), 10 Nov 93 (U).
(U) - Test and Evaluation Master Plan (TEMP) for Cheyenne Mountain Upgrade (CMU) Program, 1 May 92 (U).

G. (U) RELATED ACTIVITIES:

(U) - Program Element # 0305902F, Ballistic Missile Tactical Warning/Attack Assessment System.
(U) - Program Element # 0305904F, Space Defense Interface Network.
(U) - Program Element # 0305907F, NCMC - Space Defense Systems.
(U) - Program Element # 0305908F, TW/AA Interface Network.
(U) - Program Element # 0305909F, Ballistic Missile Early Warning System (BMEWS) Modernization.
(U) - Program Element # 0305911F, Defense Support Program (DSP).
(U) - Program Element # 0305912F, Sea-Launched Ballistic Missile (SLBM) Warning Radar Systems.
(U) - The Joint Potential Designator (JPD) does not apply.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

(U) - Procurement (BA #7 P-1 Line Number 3160):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, Budget Activity #3, Program Title Cheyenne Mountain Upgrade								
27,630	17,072	6,690	16,019	6,835	9,173	7,460	Cont.	TBD

NOTE: FY 1994-99 includes current Cheyenne Mountain systems support funds and Cheyenne Mountain Upgrade (CMU) procurement and sustaining engineering funds. Also includes CMU initial spares funds.

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems
Project Number: 3880
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Communications System Segment Replacement (CSSR) Red Tech Control Upgrade	4/91	Initial Operational Capability (IOC)
Space Defense Operations Center (SPADOC 4) 4B	7/91	IOC
CSSR Message Processing Display Subsystem	8/91	IOC
Granite Sentry Missile Warning and NORAD Command Center and Alternate Processing & Correlation Center (APCC) IOC	12/91	IOC
Granite Sentry Weather Support Unit	10/92	IOC

Program Element: #0305906F
PE Title: NCMC-TW/AA Systems

Project Number: 3880
Budget Activity: #7 - Operational Systems Support
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

T&E ACTIVITY (TO COMPLETION)

Event	Date	Results
Communications System Segment Replacement (CSSR) (Black Tech Control) Initial Operational Capability (IOC)	1st Qtr FY 94	Currently in Test
Command & Control Processing and Display System-Replacement (CCPDS-R (all three subsystems)) IOC	1st Qtr FY 94	Currently in Test
Alternate Processing Correlation Center (APCC) CCPDS-R IOC and STRATCOM Unique IOC	1st Qtr FY 95	N/A
Space Defense Operations Center (SPADOC 4C) IOC	4th Qtr FY 95	Currently in Test
Survivable Communications Integration System (SCIS) IOC	1st Qtr FY 96	N/A
Cheyenne Mountain Upgrade (CMU) Full Ops Capability	1st Qtr FY 96	N/A

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305909F
PE Title: Ballistic Missile Early Warning System (BMEWS)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity:#3 Strategic Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
3,689	554	0	0	0	0	0	0	158,700
Total								
3,689	554	0	0	0	0	0	0	158,700

B. (U) BRIEF DESCRIPTION OF ELEMENT: The BMEWS radars mission is to detect, track, and provide warning of a ballistic missile attack against the US, Canada, the UK and Europe. The system consists of three radar sites, one each at Thule AB, Greenland; RAF Fylingdales, UK; and Clear AFB, Alaska -- all operational since the early 1960s. This program element already funded development and installation of a two-faced phased array at Thule AB to provide increased track capacity and warning accuracy required due to threat changes. Budget Activity #7 is appropriate for post-IOC technical assistance to users of operational systems.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2622, BMEWS:
Current funding completes upgrade of a three-faced phased array radar at RAF Fylingdales. This is a joint US-UK project. Facility construction costs of $74 million were fully funded by the UK.

(U) FY 1993 Accomplishments:
- (U) Supported post-IOT&E and post-IOC operational end-to-end testing of the RAF Fylingdales site with the Integrated Tactical Warning/Attack Assessment (ITW/AA) network ($1.8M).
- (U) Provided engineering support to UK operational testing, conducted post-test analysis, corrected minor deficiencies and performed associated regression testing ($.5M).
- (U) Identified and supported interface adjustments required by the Cheyenne Mountain Upgrade (CMU) program and other ITW/AA systems ($1.4M).

(U) FY 1994 Plans:
- (U) Support administrative contract close-out activities and any post-IOC technical assistance that may be needed by the UK IAW the US-UK

Program Element: #0305909F
PE Title: Ballistic Missile Early Warning System (BMEWS)
Budget Activity: #7 - Operational Systems Development
Old Budget Activity:#3 Strategic Programs
MOA and FMS case ($.6M).

Date: February 1994

(U) FY 1995 Plans: Not Applicable.

(U) Work Performed By: Prime contractor is Raytheon, Wayland, MA. Major subcontractors are Control Data Corporation, Minneapolis, MN (computer hardware), and TRW, Redondo Beach, CA (software). The program is managed by Air Force Materiel Command's Electronic Systems Center (ESC), Hanscom AFB, MA. Technical support is provided by MITRE, Bedford, MA.

(U) Related Activities:
- (U) Program Element #0305906F, NCMC-TW/AA Cheyenne Mountain Upgrade (CMU).
- (U) Program Element #0305912F, Sea-launched Ballistic Missile (SLBM) Radar Systems.
- (U) Program Element #0305911F, Defense Support Program (DSP).
- (U) Program Element #0305912F, Spacetrack.
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Memorandum of Understanding between the United States and the United Kingdom concerning the Modernization of the Ballistic Missile Early Warning Station, Royal Air Force Fylingdales, Yorkshire, United Kingdom, 13 October 1986 (U). Letter of Offer and Acceptance between the United States Department of Defense and the Government of the United Kingdom, Defense Procurement Office, 8 May 88 (U).

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Developn.ent
Old Budget Activity: #3-Strategic Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
2295 Space Surveillance Network Improvement Program								
16,416	18,261	9,343	9,878	4,688	4,387	6,822	Continues	Continues
2296 Space-Based Space Surveillance Command, Control and Communications (C3) Interfaces								
1,111	0	2,152	198	1,620	1,734	0	0	Continues
3903 Space Control Support (Note: FY 93 and prior year funding for Project 3903 was in 3887, Project number change only)								
7,290	3,596	966	0	0	0	0	0	29,344
4239 Air Force Maui Optical Station								
5,100	5,024	5,872	6,067	6,014	7,160	6,913	Continues	Continues
4241 Advanced Electro-Optical System								
39,325	16,575	0	0	0	0	0	TBD	TBD
4279 HAVE STARE Radar System								
0	13,519	16,063	26,342	7,031	0	0	0	63,356 *
Totals								
69,242	56,975	34,396	42,485	19,353	13,281	13,735	TBD	TBD

* Does not include prior year classified GDIP and OSD funds.

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF ELEMENT: SPACETRACK is a worldwide space surveillance network (SSN) of dedicated, collateral, and contributing electro-optical, passive RF and radar sensors. The SSN is tasked to provide space object cataloging and identification, satellite attack warning, timely notification to US forces of satellite flyover, space treaty monitoring, and scientific and technical intelligence gathering. The continued increase in satellite and orbital debris populations, as well as the increasing diversity in launch trajectories, non-standard orbits, and geosynchronous altitudes, necessitates continued modernization of the SSN to meet existing and future requirements and ensure their cost-effective supportability. SPACETRACK also provides the systems interface efforts necessary for the command and control, targeting, and damage assessment of a U.S. Antisatellite (ASAT) system. The Image Information Processing Center and Supercomputing facility for the Air Force Maui Optical Station (AMOS), were transferred to PE 62601F in FY92. The resources and responsibility for completing the HAVE STARE Radar System development were transferred to SPACETRACK from an intelligence program per Congressional direction in FY93. With the exception of the last Project (#4279), HAVE STARE, which is a #5-type (EMD phase) Budget Activity, all of these projects are #7-type Budget Activities since they involve development modifications to operational sensor network sites.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2295, Space Surveillance Network Improvement Program: Space surveillance includes space object cataloging and identification and supports the Space Defense missions of weapons support, attack warning for U.S. satellites, maintenance of space order of battle, cover-up alerts, and identification/assessment of space objects. The Space Surveillance Network Improvement Program (SSNIP) develops and implements upgrades and improvements to the SSN to correct identified deficiencies in support of those mission requirements. SSNIP also implements modifications required for supportability/maintainability. SSNIP efforts currently include reducing uncorrelated target (UCT) errors, orbital debris measurement and research, communications/data link optimization, system architecture analyses and changes to the Ground-based Electro-Optical Deep Space Surveillance System (GEODSS) in order to reduce its O&M costs.

(U) FY 1993 Accomplishments:

- (U) Initiated GEODSS modifications including relocatability features, a solid state charge coupled device sensor replacement for the obsolete Ebsicon vacuum tube cameras, and software algorithm developments to better enable detection of anomalies (changes) in geostationary spacecraft ($7.5M).
- (U) Maintained GEODSS Engineering Test Site (ETS) in Socorro, NM for the GEODSS mods ($1.5M).
- (U) Initiated effort to improve accuracy of star catalog data base to support electro-optical sensors ($.5M).
- (U) Implemented the UCT study results at the Eglin radar. Adapted MIT/Lincoln Lab Millstone Radar deep space search capability software algorithms for use by the Eglin radar ($.5M).
- (U) Continued orbital debris research and measurement effort to characterize space debris environment and develop models to predict debris too small to be reliably tracked. The results of these measurements and analysis to model and assess effects of orbital debris on the SSN and space system performance should help to focus SSN efforts and spacecraft design guidelines ($2M).
- (U) Took over the Haystack Auxiliary (HAX) radar program from NASA. This radar will provide the DOD with improved and timely near earth satellite imaging capability ($2.5M).

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

- (U) Initiated development of astrodynamic standards to improve the accuracy of orbital element data, to improve consistency between sensors and to correct basic inadequacies of existing models for non-standard and multi-day orbits ($.5M).
- (U) Continued systems engineering to define and support required sensor investments for FY 1994 implementation. Included alternatives to optimize existing near earth surveillance ($2.5M).

(U) FY 1994 Plans:

- (U) Continue FY 93 initiated GEODSS software algorithm developments to better enable detection of anomalies (changes) in geostationary spacecraft and the hardware and software design development modifications that will enable performance to be refined sufficiently to allow 3 sites to provide worldwide coverage; allow O&M cost reductions through reduction in the number of sites and consolidation of operations. The program will replace the obsolescing computer system with current generation COTS ADPE; will replace the obsolescing vacuum tubes with solid state charge-coupled device cameras; will develop remote operations capability and will enable the systems to be relocatable to sites with minimum support infrastructure ($13.5M).
- (U) Continue effort to improve accuracy of star catalog data base to support electro-optical sensors ($.2M).
- (U) Continue modifications to the Eglin radar's deep space search capability ($.8M).
- (U) Complete HAX Radar Program ($.4M).
- (U) Initiate upgrades to the communications/data links of the SSN. These upgrades will provide dedicated, secure voice and data links between SSN elements and the Space Surveillance Center in Cheyenne Mt. (and its alternate), as well as improve overall data flow capacity ($.7M).
- (U) Continue development of astrodynamic standards in order to improve the accuracy of orbital element data, in order to improve consistency between sensors and in order to correct basic inadequacies of existing models for non-standard orbits ($.3M).
- (U) Continue systems engineering effort to define and support required sensor investment programs for FY 1995 implementation. Efforts include alternatives to improve and optimize existing near earth surveillance ($3.5M).

(U) FY 1995 Plans

- (U) Continue GEODSS modifications ($4M).
- (U) Complete FY 93 initiated GEODSS anomaly detection algorithm developments ($.9M).
- (U) Continue astrodynamic standards development and star catalog maintenance efforts ($1.3M).
- (U) Complete FY 93 initiated optimization of the communications/data links of the SSN. ($.3M)
- (U) Continue systems engineering effort to define and support required sensor investment programs for FY 1996 implementation. Efforts include alternatives to improve and optimize existing near earth surveillance and begin Eglin Radar deep space range transmitter modifications ($2.9M).

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

(U) Work Performed By: Electronic System Center, Hanscom AFB, MA manages SSNIP. Contractors for the numerous development efforts include TRW, Redondo Beach, CA; SENCOM Corp., Bedford, MA; and Rockwell Power Systems, Albuquerque, NM. MIT/Lincoln Laboratories is developing the HAX radar. TRW, Redondo Beach, CA will develop the GEODSS modifications. Systems engineering and technical support is provided by MIT Lincoln Laboratory, Lexington, MA; Mitre Corp, Bedford MA; CTA, Bedford, MA; SENCOM Corp, Bedford, MA; and Aerospace Corp, El Segundo, CA.

(U) Related Activities:
- (U) Program Element #0305906F (NORAD Cheyenne Mountain Complex Tactical Warning/Attack Assessment System of Systems).
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands)

(U) Other Procurement

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation 3080		Budget Acitivity 833220 Spacetrack				Program Title Spacetrack		
7,526	11,104	16,141	11,756	14,461	13,344	12,260	Continues	Continues

(U) International Cooperative Agreements: None.

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

2. (U) Project 2296, Space-Based Space Surveillance (C3) Interfaces Evaluates the potential space-based sensor contributions to the missions of the Space Surveillance Network (SSN). Evaluates the command, control and communications (C3) interfaces and potential operations concepts for the tasking of space-based sensors in concert with the ground-based SSN. This project will also take advantage of the Ballistic Missile Defense Organization (BMDO) Space Based Visible (SBV) experiment on the Midcourse Space Experiment (MSX) testbed predecessor to the Brilliant Eyes (BE) Dem/Val prototype satellites.

(U) FY 1993 Accomplishments:
- (U) Evaluated potential for use of BMDO's SBV experiment data to evaluate space-based sensor technologies and concepts for space surveillance.

(U) FY 1994 Plans:
- (U) None.

(U) FY 1995 Plans:
- (U) Evaluate Space surveillance Network (SSN) and Cheyenne Mountain Complex (CMC) C3 interfaces to understand tasking and analysis requirements of combined ground and space-based sensors (BMDO's MSX and BE) potential contributions to space surveillance. Analyse typical products produced by space-based platforms and evaluate various algorithms for scheduling tasking and data analysis for integration with ground systems ($2.2M).

(U) Work Performed By: Air Force Materiel Command's Electronic Systems Center (ESC), Hanscom AFB, CA and Space and Missile Systems Center (SMC), Los Angeles AFB, CA jointly manage this project. Systems engineering and technical support to these product centers is provided by the MITRE Corporation, Bedford, MA, and the Aerospace Corporation, Los Angeles, CA, respectively.

(U) Related Activities:
- (U) Program Element #0305906F (NORAD Cheyenne Mountain Complex Tactical Warning/Attack Assessment System of Systems).
- (U) BMDO PMA F2102, Space-based Sensors.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands) None.

(U) International Cooperative Agreements: None.

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

3. (U) Project 3903, Space Control Support (Note: FY 93 and prior year funding for Project 3903 was in Project 3887, Project number change only). Foreign space systems represent a continuing threat to US land, naval, and aerospace forces. Space forces enable an adversary to perform over-the-horizon targeting of US forces and provide command and control of their forces. Access to space is not limited to the former Soviet states nor to wealthy western countries. Militarily useful space imagery and communications are commercially available to almost anyone. This increased access to space will virtually ensure adversaries will have the significant force enhancement potential afforded by space systems. The US space control objectives are to guarantee free U.S. access to space in peace and deny an adversary's use or control of space in war or crisis. The DOD's ASAT program protects the option to pursue deployment of an ASAT capability if directed. The Air Force is lead for the overall ASAT system architecture, end-to-end operational testing, and the development of the Battle Management/C3 (BM/C3) infrastructure that would be required for any future capability. The Kinetic Energy ASAT weapon system program being developed by the Army was canceled in August 1993. This project does not include fielding an ASAT system. Instead the emphasis is on developing the BM/C3 specification and interfaces for integration with the Cheyenne Mountain Complex (CMC) System of Systems. The BM/C3 contractor will design and document the ASAT architecture, interfaces, and top level specifications. The contractor will also perform modeling activities to identify critical or high risk functions and interfaces for prototyping and testing.

(U) FY 1993 Accomplishments:
- (U) Completed systems engineering and developed system architecture for the overall ASAT system for both near and far term weapons ($3M).
- (U) Completed a System Design Review (SDR) ($1M).
- (U) Completed baseline system documentation including an system specification and Interface Control Drawings (ICDs) ($3M).

(U) FY 1994 Plans:
- (U) Conduct system engineering studies on the BM/C3 system ($1.5M).
- (U) Develop a BM/C3 model to define and authenticate requirements for the Space Engagement Node (SEN) ($.5M).
- (U) Develop a SEN specification and associated ICDs ($1.5M).

(U) FY 1995 Plans: Design Review and ICD open item follow-up and administrative close-out of ASAT BM/C3 contract ($.9M).

(U) Work Performed By: Electronic System Center, Hanscom AFB, MA. manages the ASAT BM/C3 program. Prime contractor is TRW, Carson, CA. Systems engineering and technical support are provided by Mitre Corp, CTA and SENCOM Corp, all located in Bedford, MA.

(U) Related Activities:
- (U) Program Element #0305906F (NORAD Cheyenne Mountain Complex Tactical Warning/Attack Assessment System of Systems).
- (U) Program Element #0603508F, Advanced Weapons Technology
- (U) There is no unnecessary duplication of effort within the Air Force or DOD.

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands) None.

(U) International Cooperative Agreements: None.

4. (U) Project 4239 Air Force Maui Optical Station The Air Force Maui Optical Station (AMOS) is a unique national R&D facility that provides measurement support to government and scientific communities, serves as a test bed for electro-optics and imaging technology, and supports operational space surveillance requirements. Part of the basic operations and support funding for AMOS is provided through this project. Outside user support through other development, measurement and experimental programs from various sources (e.g. BMDO, Intelligence, etc.) provides the balance of the funding. In addition to its primary R&D missions, this site provides critical operational data to Space Command: infrared signature data and compensated imaging data used for space object identification and mission/payload assessment. The Image Information Processing and Computer Center (IIPCC) program was transferred to PE 62601F per Congressional direction.

(U) FY 1993 Accomplishments:
- (U) Continued basic AMOS facility operations and supported upgrade integration efforts ($4.2M).
- (U) Recoated the 1.6 meter primary mirror ($.2M).
- (U) Developed electro-optical data analysis tools for USSPACECOM, ($.2M).
- (U) Began optical site networking experiment ($.2M).
- (U) Completed geosynchronous photometry experiment ($.1M).
- (U) Completed prototype AMOS Computer Control System ($.2M).
- (U) Transferred IIPCC program procurement activities initiated with this PE's FY 92 funds to PE 62601F.

(U) FY 1994 Plans:
- (U) Continue basic AMOS facility operations and support upgrade integration efforts ($4.5M).
- (U) Develop sensors for daylight imaging and geosynchronous SOI ($.2M).
- (U) Continue development of electro-optical data analysis tools for USSPACECOM, ($.2M).
- (U) Begin development of an observatory control system ($.2M).
- (U) Complete optical site networking experiment ($.2M).

(U) FY 1995 Plans:
- (U) Continue basic AMOS facility operations and support upgrade integration efforts ($5.4M).
- (U) Continue development of an observatory control system ($.2M).
- (U) Continue development of sensors for daylight imaging and geosynchronous SOI ($.2M).

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

(U) Work Performed by: Phillips Laboratory, Kirtland AFB, NM manages the operation of the AMOS facility and conducts research and development at AMOS. Rockwell Power Systems, Albuquerque, NM operates the AMOS facility.

(U) Related Activities:
- (U) There is no unnecessary duplication of effort within the Air Force or DOD.

(U) Other Appropriation Funds ($ in Thousands) None.

(U) International Cooperative Agreements: None.

Program Element: #0305910F
PE Title: SPACETRACK
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

5. (U) Project 4241 AEOS: AEOS is a 3.67 meter telescope addition to the Air Force Maui Optical Station (AMOS). The Advanced Electro-Optical System (AEOS) program was initiated in FY91 per Congressional direction. Funding to continue the program in FY 93 was also directed by Congress. Most of the funds appropriated in FY93 will be obligated in FY94 for the facility development. Additional funding in FY95 and beyond, required to complete AEOS, is not requested.

(U) FY 1993 Accomplishments:
- (U) Continued the AEOS telescope contract, awarded in Dec 91, with incremental funding in FY 93.
- (U) Successfully completed the Critical Design Review (CDR) for the telescope.
- (U) Obtained a 3.67 meter mirror blank from a cancelled Army research program.
- (U) Completed site selection.
- (U) Initiated facility design and environmental documentation.

(U) FY 1994 Plans:
- (U) Complete facility design and begin development ($33M FY 93 funds).
- (U) Initiate adaptive optics acquisition ($4M).
- (U) Develop telescope control systems ($4M).
- (U) Continue telescope development incremental funding ($5M).
- (U) Initiate sensor instrumentation acquisitions with additional funding directed/appropriated by Congress ($3.5M).

(U) FY 1995 Plans: Not Applicable.

(U) Work Performed By: Phillips Laboratory, Kirtland AFB, NM manages the AEOS project and conducts research and development at the existing AMOS facilities. Rockwell Power Systems, Albuquerque, NM operates the AMOS facility. The AEOS Telescope development is contracted with Contraves USA, Pittsburgh, PA. Systems engineering and integration support are contracted with S Systems Corp and Rockwell Power Systems respectively.

(U) Related Activities:
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands) None.

(U) International Cooperative Agreements: None.

Program Element: #0305910F
PE Title: SPACETRACK

Project Number: 4279
Budget Activity: #5 - EMD
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
HAVE STARE Radar Program								
0	13,519	16,063	26,342	7,031	0	0	0	63,356 *

* Does not include prior year GDIP and OSD funds.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The HAVE STARE (HS) radar was transferred from the intelligence budget in FY93 at the direction of Congress. The Air Force has identified a requirement for the HS system and has programmed funding in this program element to complete development and to deploy the system. HS is a high resolution X-band tracking and imaging radar with a 27 meter mechanical dish antenna. HS will be deployed as a dedicated space surveillance sensor to support the mission of space object catalog maintenance of deep space objects and mission payload assessment. The potential to support other missions is also being evaluated. Operational site location deployment has not been determined. HS will provide both an improvement in capability and a reduction in overall SPACETRACK O&M costs. This system is currently in the EMD phase.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program: (funding classified)
   - (U) Completed software Critical Design Reviews.
   - (U) Completed radar test facility at Vandenberg AFB,CA.
   - (U) Began in-plant hardware/software integration and testing.
   - (U) Completed radar hardware development and fabrication.
   - (U) Installed antenna at Vandenberg AFB, CA for in-CONUS testing.

2. (U) FY 1994 Planned Program:
   - (U) Select operational deployment site location.
   - (U) Complete software Formal Qualification Testing ($1.5M).
   - (U) Complete in-plant hardware/software integration and testing ($1M).
   - (U) Begin in-CONUS developmental test and evaluation at Vandenberg AFB, CA ($1.75M).
   - (U) Begin site surveys and communications interface design for operational deployment location ($.75M).
   - (U) Incorporate near real time imagery capability modifications ($3.6M FY 93 funds).

Program Element: #0305910F
PE Title: SPACETRACK

Project Number: 4279
Budget Activity: #5 - EMD
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

- (U) Begin incorporation of functionality and connectivity modifications required for integration with the Space Surveillance Network ($8.5M).

3. (U) FY 1995 Planned Program
   - (U) Complete in-CONUS development testing at Vandenberg AFB, CA ($.3M).
   - (U) Begin site preparation at operational deployment location ($8.3M).
   - (U) Begin packing and shipping radar facility equipment to operational deployment location ($2.1M).
   - (U) Complete operational site facility design process ($.5M).
   - (U) Continue incorporation of functionality and connectivity modifications required for integration with the Space Surveillance Network ($4.8M).

4. (U) Program to Completion:
   - (U) Deploy system to operating location.
   - (U) Continue incorporation of functionality and connectivity modifications required for integration with the Space Surveillance Network.
   - (U) Begin operating location site interface connections and radar integration.
   - (U) Complete on-site DT&E.
   - (U) Complete installation of SSN functionality/connectivity modifications in FY 97.
   - (U) Complete operating location site interface connections and radar integration.
   - (U) Conduct system IOT&E in FY 97.
   - (U) IOC in FY 1997.

D. (U) Work Performed By: Electronics System Center, Hanscom AFB, MA manages HS. Prime contractor is Raytheon Co. Wayland, MA. Systems engineering and technical support is provided by Mitre Corp, Bedford MA; Riverside Research Institute, Lexington, MA; and The Ultra Corporation, Lexington, MA.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES. None.

3. (U) COST CHANGES: None.

Program Element: #0305910F
PE Title: SPACETR \CK

Project Number: 4279
Budget Activity: #5 - EMD
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) USSPACECOM Requirements Submission (RS 03-89) for Space Surveillance, Aug 89.
- (U) AFSPACECOM SON 02-88, Space Surveillance, 13 Nov 89 (Secret).
- (U) AFSPACECOM SON 004-88, Deep Space Surveillance Radar (Eastern Hemeisphere), 13 Nov 89 (Secret)
- (U) USSPACECOM MNS 89-001, Dedicated Satellite Radar Imaging Capability (Secret).
- (U) AFSPACECOM SON 014-89, Space Object Identification, 6 May 91 (Secret).
- (U) HAVE STARE Radar System Program, PMD 2112(7)/PE63710D/35910F, 28 May 93, (Unclassified).

G. (U) RELATED ACTIVITIES:

- (U) Program Element #0305906F (NORAD Cheyenne Mountain Complex Tactical Warning/Attack Assessment System of Systems).
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Prior year GDIP and OSD funding levels are classified.

(U) Other Procurement

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation 3080		Budget Acitivity 833220 Spacetrack				Program Title Spacetrack		
-	-	918	308	309	312	423	Continues	Continues

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

(U)	Begin DT&E	FY94
(U)	Site Selection	FY94
(U)	IOT&E	FY96
(U)	IOC	FY97

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0305911F
PE Title: Defense Support Program
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs

Date: February 1994

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

	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Compl	Total Prog
3615	Talon Shield / ALERT								
	0	0	10.135	10.201	10.274	10.348	10.425	Continue	TBD
3624	Defense Support Program (DSP)								
	48,581	50,311	66,216	109,330	51,359	46,680	59,364	Continue	TBD
Total									
	48,581	50,311	76,351	119,531	61,633	57,028	69,789	Continue	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Defense Support Program (DSP) is a system of satellites in geostationary orbits, fixed and mobile ground processing stations, one multi-purpose facility, and a ground communications network (GCN). DSP's primary mission is to provide tactical warning and limited attack assessment of a ballistic missile attack. The Talon Shield/ALERT is an upgrade of a fixed ground processing station to exploit inherent satellite capability to provide theater missile warning and cueing. DSP is an operational system and is therefore included in the Operational Systems Support Research Category and Budget Activity.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0305911F
PE Title: Talon Shield/ALERT
Project Number : 3615
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs
Date: February 1994

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

	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Compl	Total Prog
Talon Shield / ALERT									
	0	0	10,135	10,201	10,274	10,348	10,425	Continue	TBD

* FY93 and FY94 funding under BMDO PE 0603216C (see paragraph H).

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Talon Shield project identified changes to existing DSP processing to enhance theater missile defense warning capabilities. These enhancements will facilitate more timely and accurate detection, identification, location and tracking of theater missile threats. This data supports attack operations/counterforce operations by providing accurate, timely launch prediction. In addition, this data will support active and passive defense forces by providing target cueing data and precise impact point prediction. The Air Force will transition these enhancements to an operational system, ALERT, to provide continuous real-time warning to operational forces.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Project BMDO funded in FY 1993
     - (U) Install and checkout demonstration system
     - (U) Continue hardware and software development for the Limited Capability (LC) Talon Shield system
     - (U) Initiate other interface development for mapping; earth imaging, weather, and navigational data
     - (U) Initiate Interim Contractor Support (ICS)

Program Element: 0305911F
PE Title: Talon Shield/ALERT
Project Number : 3615
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs
Date: February 1994

2. (U) FY 1994 Planned Program:
- (U) Project BMDO funded in FY 1994
  - (U) Continue hardware and software development for the Limited Capability (LC) system
  - (U) Continue other interface development for mapping, earth imaging, weather, and navigational data
  - (U) Continue Interim Contractor Support (ICS) for Talon Shield
  - (U) Initiate training planning

3. (U) FY 1995 Planned Program:
- (U) Combined Air Force and BMDO funded project
- (U) Initiate hardware and software development for the ALERT Initial Operational Capability (IOC) system (BMDO funded)
- (U) Initiate Interim Contractor Support (ICS) for ALERT ($9.9M)
- (U) Continue Operations and Maintenance Training Plan development and begin implementation ($0.1M)
- (U) Initiate Initial Operational Test & Evaluation ($0.1M)

4. (U) Program to Completion:
- (U) This is a continuing program
- (U) Continue Operations and Maintenance Training Plan development and implementation
- (U) Continue Initial Operational Test & Evaluation

D. (U) WORK PERFORMED BY: The Program Executive Officer (PEO) for Space is responsible for system development and acquisition. Aerojet Electronic Systems Division, Azusa, CA. Aerospace Corp, El Segundo, CA; provides technical assistance to the program office.

Program Element: 0305911F
PE Title: Talon Shield/ALERT
Project Number : 3615
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs
Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Funding for Talon Shield/ALERT was added to the Air Force budget at $10M/year.

F. (U) PROGRAM DOCUMENTATION:
- (U) Operational Requirements Document (ORD), 20 Sep 93.
- (U) Concept of Operations (CONOPS), 20 May 93.
- (U) Prototype Test Plan, 5 Nov 93.

G. - (U) RELATED ACTIVITIES
- (U) There is no unnecessary duplication of effort within the AF or the DOD.
- (U) PE #0305911F (Defense Support Program)
- (U) PE #0604325F/0305905F (Advanced Warning System/ISBTW/AA).
- (U) PE #0603216C (BMDO Advanced Development) PMA 2106 (Advanced Theater Sensors) Talon Shield/ALERT funding:

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

PE 060321C, RDT&E

FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Compl	Total Prog
20,500	16,488	15,000	15,000	15,000	15,000	15,000	Continuing	TBD

Program Element: 0305911F
PE Title: Talon Shield/ALERT
Project Number : 3615
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs
Date: February 1994

J. (U) MILESTONE SCHEDULE:

LOC Contract Award	09/93
Hardware Install Complete	02/94
System Test Complete	05/94
IOC Contract Award	01/94
IOC	TBD
FOC Certification	1/97

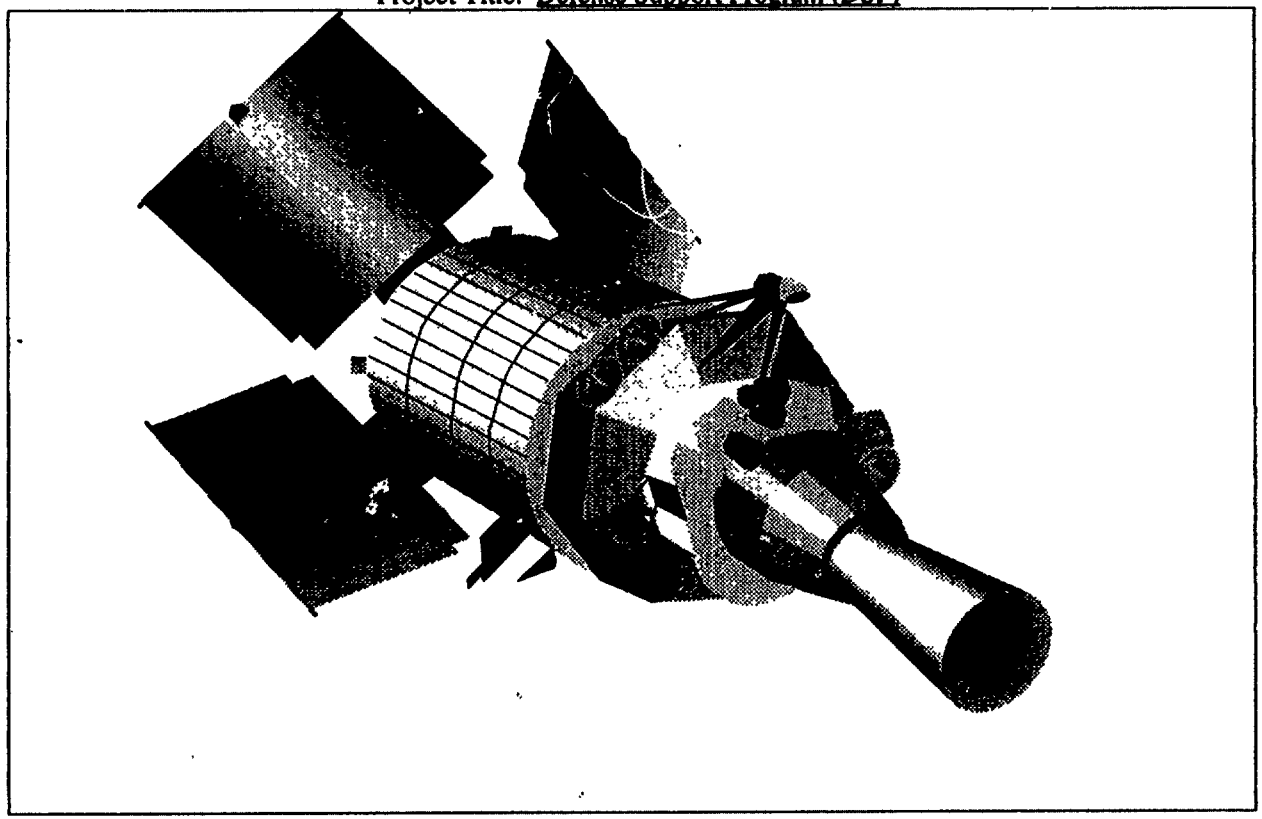
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0305911F
PE Title: Defense Support Program (DSP)

Project Number : 3624
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programst

Date: February 1994

Project Title: Defense Support Program (DSP)



Program Element: 0305911F
PE Title: Defense Support Program (DSP)

Project Number : 3624
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programst

Date: February 1994

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	TO COMPL
Program Milestones	Sat 23-25 MYP AWD	Transfer MPF to AFMC						
Engineering Milestones	System I Termination	LCS Termination						
T&E Milestones		Talon Shield LOC	SRSU Install Complete	Talon Shield IOC				
Contract Milestones	MWIR AWD	Fixed Site AWD	Transition MCS AWD				Sat 23 Delivery	

BUDGET ($000)	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	Total (To Complete)
Major Contracts	32,359	22,627	46,415	81,900	21,546	21,106	44,098	Continuing
Support Contracts	7,711	19,372	11,411	14,131	20,674	12,458	2,194	Continuing
In House Support	4,967	2,825	4,568	6,800	3,834	7,652	7,443	Continuing
GFE/Other	3,544	5,487	3,822	6,124	5,305	5,464	5,629	Continuing
TOTAL	48,581	50,311	66,216	109,330	51,359	46,680	59,364	Continuing

Program Element: 0305911F
PE Title: Defense Support Program (DSP)

Project Number : 3624
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The DSP system consists of a constellation of satellites in geostationary orbits, fixed and mobile ground processing stations, one multi-purpose facility, and a ground communications network (GCN). This program element provides funding for development to modernize fixed and mobile ground systems, plan and implement consolidation of mission processing in CONUS, support integration of satellites to launch vehicles, support the orbital constellation, and support other program requirements as required. DSP is an operational system and is therefore included in the Operational Systems Support Research Category and Budget Activity.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1 (U) FY 1993 Program:
- (U) Terminated replacement of fixed ground station software ($3.8M).
- (U) Started replacement of overloaded computers to sustain the DSP fixed ground stations($6.2M).
- (U) Completed delivery of operational capability to AFSPC with the upgrade to mobile ground terminals #5 and #6 ($2.4M).
- (U) Continuing Satellite Readout Station Upgrade (SRSU) ($0.1M).
- (U) Contracted for development of the Medium Wave InfraRed (MWIR) mid wave satellite sensor capability ($3.7M).
- (U) Began satellite special study to design and develop an alternate reaction wheel assembly bearing design to correct an anomalous on-orbit condition ($0.6M).

2. (U) FY 1994 Planned Program:
- (U) Assume responsibility for consolidated support of DSP software from AFSPC (N/A).
- (U) Develop capability required to sustain DSP satellites mission processing capability on new computers at the Multi-Purpose Facility, Centralized Integrated Support Facility, CONUS Ground Station, and Overseas Ground Station
- (U) Begin development of software to transition ground station from existing IBM 3033 computers to supportable replacement computers ($9.0M)
- (U) Begin CGS and MPF facility design modifications required to install the CGS replacement computers ($4.9M)

Program Element: 0305911F
PE Title: Defense Support Program (DSP)

Project Number : 3624
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs

Date: February 1994

- (U) Continue development to replace unsupportable satellite readout equipment at the fixed ground stations. Complete installation and checkout for both Satellite Readout Station Upgrade sites ($3.6M).
- (U) Continue development of software to exploit satellite capability to detect, track, and report missile events in both the strategic and tactical environment ($12.3M).
- (U) Develop an interface for the DSP mobile ground terminal and the Milstar communication vehicle ($1.7M).
- (U) Develop the fiber optic interface for DSP mobile ground terminal compatibility with upgraded DSCS communication vehicle ($0.2M).
- (U) Continue reaction wheel assembly bearing study ($0.6M).
- (U) Continue Special Studies for satellite production, as required ($0.5M)

3. (U) FY 1995 Planned Program:

- (U) Continue development to replace fixed ground station software. Upgrade current software ($3.6M).
- (U) Continue development of software to exploit satellite capability ($5.9M)
- (U) Continue development of software to transition ground station from existing IBM 3033 computers to supportable replacement computers ($8.0M)
- (U) Continue CGS and MPF facility design modifications required to install the CGS replacement computers ($4.9M)
- (U) Begin modifications required to implement required consolidated mode operations ($6.0M)
- (U) Continue System 8 software deficiency correction modifications ($10.4M)
- (U) Begin Independent Verification & Validation (IV&V) of software modifications ($2.0M)
- (U) Begin special studies to support DSP satellite manufacturing, production, test and launch activities as required ($1.8M).
- (U) Complete integration of DSP mobile ground terminal and Milstar mobile communication vehicle ($1.2M).
- (U) Begin fiber optic upgrade of DSP mobile ground terminal for compatibility with DSCS communication vehicle ($5.9M).
- (U) Continue development to replace unsupportable satellite readout equipment at the fixed ground stations. Complete installation and checkout for the overseas ground station ($10.6M).

Program Element: 0305911F
PE Title: Defense Support Program (DSP)

Project Number : 3624
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs

Date: February 1994

4. (U) FY 1996 Planned Program:
- (U) Begin development of follow-on DSP transition ($0M).
- (U) Continue development of software to transition ground station from existing IBM 3033 computers to supportable replacement computers ($3.0M)
- (U) Continue mission processing software deficiency correction modifications ($18M)
- (U) Continue ground station modifications required to implement consolidated mode operations ($9.2M)
- (U) Complete IV&V of software modifications ($3.0M)
- (U) Develop worldwide data connectivity for satellite communications paths from the CGS to external users ($4.2M)
- (U) Design and develop consolidated ground station for next generation early warning satellite operations ($16.8M)
- (U) Continue special studies to support DSP satellite manufacturing, production, test and launch activities as required ($1.7M).
- (U) Complete software development to support the Talon Shield/ALERT program ($10.2M).
- (U) ($3.0M)
- (U) Develop plan for interconnectivity of DSP mobile ground terminal with other transportable and fixed Milstar terminals ($0.5M).
- (U) Demonstrate integrated DSP/Milstar mobile operational capability ($0.5M).
- (U) Demonstrate upgraded DSP/DSCS operational capability ($0.5M).

5. (U) Program to Completion:
- (U) This is a continuing program until replaced by the next generation early warning satellite.
- (U) Continue ground station evolution to integrate new capabilities and new satellites as they are launched.
- (U) Continue sustainment activity on mobile ground system.

D. (U) WORK PERFORMED BY: The Program Executive Officer (PEO) for Space is responsible for system development and acquisition. The major contractors are TRW, Redondo Beach, CA; Aerojet Electronic Systems Division, Azusa, CA; IBM, Boulder, CO; Aerospace Corp, El Segundo, CA; Sandia National Laboratories, Albuquerque, N.M.; and Los Alamos National Laboratories, Los Alamos, N.M., and SM-ALC Det 25, Colorado Springs, CO.

Program Element: 0305911F
PE Title: Defense Support Program (DSP)

Project Number: 3624
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs

Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: DSP Program Office has assumed life cycle support for the system under Integrated Weapons Systems Management philosophy. Sustainment and support activity is now an integral portion of the technical effort. DSP Program Office recently accepted lead role for a joint program with ESC/MS to provide an integrated DSP/Milstar capability for the DSP mobile ground system. DSP Program Office is now required to respond to an Army upgrade of the DSCS communication vehicle to a fiber optic interface in order to maintain compatibility. The DSP Mission Control Station (MCS) will be modified to continue to process mission data from both DSP and the next generation early warning satellite during the transition from one system to the other.
2. (U) SCHEDULE CHANGES: Satellite launch schedules will be stretched from launching on 6 month centers to launching on 18 month centers. Satellite production schedules were also slowed down to minimize the cost impacts of implementing the new launch schedule. New schedules are required for upgrading the existing software at the fixed ground stations due to the termination of the contract for development of replacement software (System I). Schedules were also revised for the ground computer changeout as a result of the System I termination.

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
- (U) DepSecDef memo to SecAF, DSARC I for Advanced Warning Systems (S), 15 Feb 80.
- (U) SecDef memo to SecAF, MENS for Improved Missile Warning and Attack Assessment (S), 19 Mar 80.
- (U) DSP System Operational Concept (SOC) (S), 1 Dec 87.
- (U) DSP Operational Requirements Document (ORD), Dec 93 draft.

Program Element: 0305911F
PE Title: Defense Support Program (DSP)

Project Number : 3624
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs

Date: February 1994

G. (U) RELATED ACTIVITIES
- (U) PE #0305911F (Defense Support Program)
- (U) PE #0604325/0305905F (Advanced Warning System/ISBTW/AA).
- (U) PE #0603735F/0303605F (Defense Satellite Communications System/Satellite Communications Terminals).
- (U) PE #0303601F (Milstar AF Terminals).
- (U) PE #0305144F/0305171F/0305138F (Titan Space Boosters/Space Launch Support/Upper Stages Program).
- (U) PE #0102310F/0102313F (Cheyenne Mountain Upgrade Programs/Integrated TW/AA System).
- (U) PE #0305110F (AF Satellite Control Network).
- (U) PE #0604766A (Tactical Electronic Surveillance System).
- (U) PE03603441F/0604441F (Advanced Space Based TW/AA)
- (U) There is no unnecessary duplication of effort within the AF or the DOD.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998t	FY 1999	To Compl	Total Prog
Appropriation Weapons Procurement, Budget Activity #5 Space and Other Support, Program Title DSP								
228,969	356,309	363,959	196,203	162,344	163,432	168,675	Continue	TBD
Appropriation * Other Procurement, Budget Activity #3 - Commun Electronics, Program Title DSP								
48,536	29,289	18,830	70,512	25,467	32,968	30,615	Continue	TBD

Program Element: C305911F
PE Title: Defense Support Program (DSP)

Project Number : 3624
Budget Activity: 7 Operational Systems Support
Old Budget Activity: 3 Strategic Programs

Date: February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
MGT #3 Upgrade Acceptance Test	Aug 92	Test Completed Successfully
MGT #4 Upgrade Acceptance Test	Aug 92	Test Completed Successfully
IMF Facility upgrade integration	Feb 93	Final integration complete
SMF Facility upgrade integration	Jul 93	Final integration complete
MGT #5 Upgrade Acceptance Test	Jul 93	Test Completed Successfully
MGT #6 Upgrade Acceptance Test	Aug 93	Test Completed Successfully

T&E ACTIVITY (TO COMPLETE)

Event	Date	Results
Install & Checkout Conus Ground Station SRSU Antenna #2	May 94	TBD
Install & Checkout Conus Ground Station SRSU Antenna #1	Nov 94	TBD
Conus Ground Station SRSU Turnover	Nov 94	TBD
Install & Checkout Overseas Ground Station SRSU Antenna #2	July 95	TBD
Install & Checkout Overseas Ground Station SRSU Antenna #1	Dec 95	TBD
Overseas Ground Station SRSU Turnover	Dec 95	TBD

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305913F
PE Title: Nuclear Detonation (NUDET) Detection System (NDS)
Budget Activity: 7 Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

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

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Project 2124 Nuclear Detonation Detection System (Data Processing)								
2,115*	0	0	0	0	0	0	Cont	Cont
Project 2808 Nuclear Detonation Detection System (Sensors)								
5,397	9,307	10,140	6,209	5,045	5,306	5,593	Cont	Cont
Totals								
5,397	9,307	10,140	6,209	5,045	5,306	5,593	Cont	TBD

* Funded in PE 0301357F in FY 93 and prior.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The National Command Authorities require a highly survivable capability to detect, locate, and report any nuclear detonation (NUDET) on a global basis in near real time. The NUDET Detection System consists of sensors integrated on the operational Navstar Global Positioning System (GPS) satellites plus a user segment consisting of ground software know as the Integrated Correlation and Display System (ICADS) and the Ground NDS Terminals (GNTs). The GPS/NDS satellite payload consists of X-ray, optical, and electromagnetic pulse (EMP) sensors. These sensors, when coupled with the extremely precise GPS timing capability, will provide location of nuclear bursts worldwide with an accuracy of These data are crosslinked to other GPS/NDS satellites to provide worldwide connectivity. A broad range of

CLASSIFIED BY: Multiple Sources
DECLASSIFY BY: OADR

Program Element: #0305913F
PE Title: Nuclear Detonation (NUDET) Detection System (NDS)
Budget Activity: 7 Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

users (National Command Authorities, Strategic Command, US Space Command) receive NUDET data, direct from the spacecraft, on the precise location, yield, count, time, and height of burst.

These activities were formally covered under Program Element 0301357F.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

(U) Project Number 2124, Nuclear Detonation Detection System (NDS):
This program funds development/integration of the data crosslink and downlink and integration of sensors and NDS processors on the GPS spacecraft. This program complements Project number 2808 which develops and procures EMP sensors for GPS satellites and develops NDS ground terminal prototypes.

1. (U) FY 1993 Accomplishments:
   - (U) Completed development and qualification of integrated NDS hardware systems into Block IIR spacecraft. ($1,058)
   - (U) Completed the Block IIR NDS satellite crosslink/downlink system qualification. ($634)
   - (U) Developed engineering solutions to deficiencies identified during testing. ($423)

2. (U) FY 1994 Plans:
   - (U) Funds transferred to Project 2808

3. (U) FY 1995 Plans:
   - (U) Funds transferred to Project 2808

Program Element: #0305913F
PE Title: Nuclear Detonation (NUDET) Detection System (NDS)
Budget Activity: 7 Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

(U) Work Performed By: System development and procurement is accomplished by the AFMC's Space and Missile Systems Center, Los Angeles AFB, CA aided by Rockwell International, Seal Beach, CA integrates the NDS sensors on Block II GPS satellites and produces the EMP sensor for Block II. Martin Marietta, Valley Forge, PA will integrate NDS sensors on Block II replenishment satellites. The Aerospace Corporation, El Segundo, CA, provide systems support. Sandia National Laboratories, Albuquerque, NM, and Los Alamos National Laboratory, Los Alamos, NM, are under contract with DOE to produce the X-ray and optical nuclear detonation sensors.

(U) Related Activities:
- (U) PE 0305165F, Navstar Global Positioning System (GPS) Space Segment

- (U) There is no unnecessary duplication of effort within the AF or the DoD

(U) Other Appropriation Funds ($ in Thousands):
- (U) Not applicable

(U) International Cooperative Agreements: Not applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0305913F
PE Title: Nuclear Detonation (NUDET) Detection System (NDS)

Project Number: 2808 Date: February 1994
Budget Activity: 7 Operational Systems Development
Old Budget Activity: #3-Strategic Programs

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

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
5,397	9,307	10,140	6,209	5,045	5,308	5,593	Cont	Cont

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The National Command Authorities require a highly survivable capability to detect, locate, and report any nuclear detonation (NUDET) on a global basis in near real time. The NUDET Detection System consists of sensors integrated on the operational Navstar Global Positioning System (GPS) satellites plus a user segment consisting of ground software know as the Integrated Correlation and Display System (ICADS) and the Ground NDS Terminals (GNTs). The GPS/NDS satellite payload consists of X-ray, optical, and electromagnetic pulse (EMP) sensors. These sensors, when coupled with the extremely precise GPS timing capability, will provide location of nuclear bursts worldwide with an accuracy of These data are crosslinked to other GPS/NDS satellites to provide worldwide connectivity. A broad range of users (National Command Authorities, Strategic Command, US Space Command) receive NUDET data, direct from the spacecraft, on the precise location, yield, count, time, and height of burst.

These activities were formerly covered under Program Element 0301357F.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Continued final engineering development and requalification of NDS sensors for Block IIR satellites. ($375)
   - (U) Continued performance testing of Block IIR satellite NDS EMP sensor ($957)

Program Element: #0305913F
PE Title: Nuclear Detonation (NUDET) Detection System (NDS)

Project Number: 2808
Budget Activity: 7 Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

- (U) Continued Ground NDS Terminal (GNT) development ($1,105)
- (U) Completed GNT system Preliminary Design Reviews (PDR) and hardware Critical Design Review ($410)
- (U) Continued development of GNT software common to the Integrated Correlation and Display System (ICADS) ($2,050)
- (U) Continued development of AFSPACECOM AFTAC Laser Facility (AALF) ($500)

2. (U) FY 1994 Planned Program:
   - (U) Continue GNT development, integration and test ($2,631)
   - (U) Continue development of ICADS software upgrade ($3,897)
   - (U) Continue initial EMP sensor on-orbit qualification ($576)
   - (U) Continue development of AFSPACECOM AFTAC Lazap Facility (AALF) ($2,203)

3. (U) FY 1995 Planned Program:
   - (U) Complete GNT development and begin installation into USSTRATCOM and AFSPACECOM mobile command posts ($[illegible])
   - (U) Begin GNT software upgrade development for Block IIR satellite ($1,285)
   - (U) Continue development of ICADS software upgrade ($1,225)
   - (U) Continue EMP sensor on-orbit qualification ($648)
   - (U) Begin development and redesign of EMP sensor due to parts obsolescent for sustainment satellites ($5,336)
   - (U) Continue development of AFSPACECOM AFTAC Lazap Facility (AALF) ($1,001)

4. (U) Program to Completion:
   - (U) Complete NDS qualification for Block IIR satellite
   - (U) Continue GNT Block IIR software modification development

Program Element: #0305913F
PE Title: Nuclear Detonation (NUDET) Detection System (NDS)

Project Number: 2808
Budget Activity: 7 Operational Systems Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

D. (U) WORK PERFORMED BY: System development and procurement is accomplished by the AFMC's Space and Missile Systems Center, Los Angeles AFB, CA aided by Rockwell International, Seal Beach, CA integrates the NDS sensors on Block II GPS satellites and produces the EMP sensor for Block II. Martin Marietta, Valley Forge, PA will integrate NDS sensors on Block II replenishment satellites. The Aerospace Corporation, El Segundo, CA, provide systems support. Sandia National Laboratories, Albuquerque, NM, and Los Alamos National Laboratory, Los Alamos, NM, are under contract with DOE to produce the X-ray and optical nuclear detonation sensors. Dallas, TX, developed the GNT. Sandia National Labs will develop the NDS Ground Terminal prototypes.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None

F. (U) PROGRAM DOCUMENTATION:
- (U) Mission Need Statement, 19 Feb 87
- (U) Operational Requirements Document, 21 Mar 91

G. (U) RELATED ACTIVITES:
- (U) PE 0305165F, Navstar Global Positioning System (GPS) Space Segment

Program Element: #0305913F
PE Title: Nuclear Detonation (NUDET) Detection System (NDS)

Project Number: 2808 Date: February 1994
Budget Activity: 7 Operational Systems Development
Old Budget Activity: #3-Strategic Programs

- (U) PE 0305999F, Data Analysis
- (U) There is no unnecessary duplication of effort within the AF or the DoD

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

Appropriation 3020 (BA 5, Other Support, 29IOND), Budget Activity 6.7 Operational Systems Development,
Program Title: Nuclear Detonation (NUDET) Detection System

FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
41,621*	41,836	45,603	29,107	29,109	30,400	31,749	Cont	Cont

* Partially funded in PE 030137F in FY93 and prior

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

J. (U) MILESTONE SCHEDULE:

1. (U) Space Segment FOC (18 Satellites) EMP Sensor	Mar 95*
*Based on projected GPS replenishment launches	
2. (U) GNT Prototype Delivery	Aug 95
3. (U) GNT Production Unit Delivery	Feb 96
4. (U) GNT Block IIR Capability	Jan 98
5. (U) ICADS IOC at AFSPC	May 94
6. (U) ICADS Block IIR Capability	Mar 98

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0401218F **Date: February 1994**
PE Title: KC-135 Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
72214	Improved Air Refueling System (IARS)							
3,499	3,060	5,160	3,494	3,415	3,539	3,679	Cont	TBD
74285	Receptacle Modification							
0	3,107	0	0	0	0	0	TBD	TBD
74286	Multipoint Modification							
0	5,578	0	0	0	0	0	TBD	TBD
Total								
3,499	11,745	5,160	3,494	3,415	3,539	3,679	TBD	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES

This program element contains three efforts. The Improved Air Refueling System (IARS) program is an on-going effort identifying air refueling system deficiencies and developing alternatives that will correct the deficiencies. The Receptacle Modification Program places receptacles on forty-two KC-135R aircraft. The receptacles will increase the flexibility of the tankers and allow for increased off-loads at extended ranges. The Multipoint Modification Program will place two air refueling pods on forty-two KC-135R aircraft. The refueling pods will provide increased flexibility and enhanced interoperability with Navy, NATO and allied aircraft. The program element is in research category 6.7 due to Phase II development activities.

Program Element: #0401218F
PE Title: KC-135 Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) 72214: Improved Air Refueling System (IARS)
IARS funds research and development that will improve the aerial refueling system of the KC-135 fleet. This requirement, established by the SAC Statement of Need (SON) 001-87, identifies deficiencies in the KC-135 refueling capability. The IARS program investigates correction of systems deficiencies improving overall refueling capability and associated refueling procedures. This is a continuing program. Operational users prioritize each year's activities so the most serious deficiencies are addressed.

(U) FY 1993 Accomplishments:
(U) - Corrosion Control Study ($2,200)
(U) -- Supported KC-135 Operational Life Expectancy Program--objective to extend KC-135 service life.
(U) -- Surplus KC-135s dismantled to identify hidden corrosion which could limit airframe service life.
(U) -- Vendor demonstrations of non-destructive instrumentation to identify hidden corrosion in aircraft lap joints and wing rivets--five vendor systems showed promise.
(U) - Phase IV Crew Reduction Study ($350)
(U) -- Compared workload and ability to accomplish mission using two and three crew members in cockpit.
(U) -- Reallocated navigation function to pilot and copilot.
(U) - Improved Boom Nozzle ($150)
(U) -- Completed ground testing of nozzle designed to correct deficiencies in existing system.
(U) - Improved Boom ($330)
(U) -- Conducted studies to identify technologies for expanded boom envelope.
(U) - Mission support-other. ($469)

Program Element: #0401218F **Date: February 1994**
PE Title: KC-135 Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

(U) FY 1994 Plans:
(U) - Continue corrosion control studies; continuing activity. ($1,960)
(U) - Continue "threat" study for the operational life expectancy program; continuing activity. ($350)
(U) - Improved Boom Nozzle; continuing activity. ($300)
(U) -- Purchase four test nozzles.
(U) -- Fight test nozzles.
(U) - Crew Station Evaluation Station; continuing activity. ($350)
(U) -- Identify architecture for cockpit modernization program.
(U) -- Conduct study to identify navigator functions in threat situations.
(U) - Improved Boom Envelope; continuing activity. ($100)
(U) -- Perform wind tunnel testing.
(U) -- Air Force Institute of Technology (AFIT) support.

(U) FY 1995 Plans:
(U) - Continue corrosion control studies; continuing activity. ($2,020)
(U) -- Identify alternatives to non-destructive instrumentation issues.
(U) -- Start Service Life Extension Program (SLEP) activities.
(U) - Operational Life Expectancy Program; continuing activity. ($200)
(U) -- Continue "threat" studies.
(U) - Conduct Hush Kit studies and evaluations; continuing activity. ($1,700)
(U) -- Identify Hush Kit design for Air National Guard and Open Skies aircraft to meet FAA noise abatement requirements.
(U) - Improved Boom Nozzle; continuing activity. ($440)
(U) -- Purchase 20 nozzles for operational testing.
(U) - Improved Boom; continuing activity. ($300)
(U) -- Acquire prototype for testing.
(U) - Continue cockpit modernization studies; continuing activity. ($500)

Program Element: #0401218F **Date: February 1994**
PE Title: KC-135 Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

(U) Work Performed By: ARINC Research Corporation, Annapolis, MD; Boeing Military and Space Group, Wichita, KS; Frontier Technology, Inc., Santa Barbara, CA; Parker Hannifin, Los Angeles, CA; J.C. Carter Company, Costa Mesa, CA.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) 74285: Receptacle Modification:
The Air Force tanker mission is to extend the range and mission effectiveness of combat, reconnaissance, and airlift forces of all commands and services. KC-135s are used in worldwide deployment and theater employment roles and are capable of delivering fuel to various Air Force, Navy, Marine, NATO, and other allied aircraft with minimum reliance on forward basing. The questionable availability of forward basing and off-load demands at extended ranges results in additional tanker requirements for mission success. Refueling could be conducted more efficiently and the air campaign tempo increased if KC-135 tanker aircraft could provide increased off-loads at extended ranges and could accommodate closer waves of fighters. To minimize operational expense and increase mission effectiveness, the KC-135 fleet requires the capability to operate in a more efficient manner. Receptacle-equipped KC-135s will provide increased off-loads at extended ranges, increased tanker utilization, reduced reliance on forward basing, and enhanced mission flexibility. These requirements were established by AMC Mission Need Statement 003-92 and AMC Operational Requirements Document 003-92-I/II.

(U) FY 1993 Accomplishments:
(U) - None.

Program Element: #0401218F **Date: February 1994**
PE Title: KC-135 Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

(U) FY 1994 Plans:
(U) - Restructure program as result of revised funding.
(U) - Review and update acquisition strategy as required.
(U) - Activities subsequent to full funding certification.
(U) -- Award contract for design, development & prototype of Receptacle Modification; estimated completion: May 94.
(U) -- Government program management (source selection, contracting activities, travel); continuing activity. ($507)
(U) -- Contractor initial design and Preliminary Design Review; estimated completion: Aug 94. ($500)
(U) -- Contract or design and Critical Design Review; estimated completion. Oct 94. ($1,000)
(U) -- Contractor program management (form teams, support reviews, support planning); continuing activity. ($500)
(U) -- Prototype materiel procurement; estimated completion: Jan 95. ($500)

(U) FY 1995 Plans.
(U) - RDT&E complete.

(U) Work Performed By: Modification effort will be managed by the System Program Director (SPD) at Tinker AFB, OK. The SPD will be assisted by ASC/SDC located at Wright Patterson AFB, OH. ASC/SDC will address integration issues between the Receptacle and Multipoint Air Refueling Modifications. The SPD will contract with a Design Engineering Program (DEP) contractor or ASC/AM located at Wright Patterson AFB, OH for development of the modification kit. The modification will be installed at depot during Programmed Depot Maintenance (PDM) cycle.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0401218F **Date: February 1994**
PE Title: KC-135 Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: Aircraft (3010) Procurement, Budget Activity: #5 Modifications, Program Title: Receptacle Modification								
0	0	12,000	24,000	21,600	20,400	20,400	4,500	102,900

(U) International Cooperative Agreements: Not Applicable.

3. (U) 74286: Multipoint Modification:
The Multipoint Refueling System (MPRS) permits simultaneous refueling of two probe-equipped receivers. The system provides enhanced reliability through redundancy for probe/drogue refueling and allows refueling of probe-equipped and receptacle-equipped receivers during a single mission (not simultaneously). The system also enhances interoperability with Navy, NATO and other allied receivers. This requirement was established by AMC Mission Need Statement 003-92 and AMC Operational Requirements Document 003-92-I/II.

(U) FY 1993 Accomplishments:
(U) - None.

Program Element: #0401218F **Date: February 1994**
PE Title: KC-135 Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

(U) FY 1994 Plans:
(U) -Restructure program as result of revised funding.
(U) -Review and update acquisition strategy as required.
(U) -Activities subsequent to full funding certification.
(U) -- Award contract for design, development & prototype of Multipoint Modification; estimated completion: Sept 94.
(U) -- Government program management/support (source selection, travel, SETA support); continuing activity. ($600)
(U) -- Contractor initial design and Preliminary Design Review; estimated completion: Jan 95. ($4,478)
(U) -- Contractor program management (form teams, support reviews & support planning); continuing activity. ($500)

(U) FY 1995 Plans:
(U) -RDT&E funding zero in FY95 and subsequent years.

(U) Work Performed By: The Multipoint Refueling System (MPRS) modification effort will be managed by the Development System Manager (DSM) for the System Program Director (SPD). The DSM is located at ASC/SDC, Wright-Patterson AFB, OH. The SPD is located at OC-ALC/LAC, Tinker AFB, OK. The DSM will conduct a competitive source selection. Installation of Group A kits will be accomplished at depot during Programmed Depot Maintenance. Location of depot will be the decision of the System Program Director.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

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PE Title: KC-135 Squadrons
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #3 Strategic Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: (3010), Budget Activity: #5 Modifications, Program Title: Multipoint Modification;								
0	0	25,800	41,000	34,100	32,300	32,300	6,100	171,600

(U) International Cooperative Agreements: US/Australia Data Exchange Annex AF-90-AUST-7019 to Air-to-Air Refueling.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0601102F
PE Title: Defense Research Sciences
Budget Activity: #1, Basic Research
Old Budget Activity: #1, Technology Base

Date: February 1994

A (U) RESOURCES ($ in Thousands)

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2301 Physics	18,456	17,492	20,720	21,711	22,385	23,085	23,828	Cont	TBD
2302 Solid Mechanics and Structures	11,654	12,548	13,180	13,825	14,265	14,722	15,206	Cont	TBD
2303 Chemistry	25,309	25,191	30,567	32,007	32,986	34,007	35,087	Cont	TBD
2304 Mathematics and Computer Sciences	26,548	29,437	32,080	33,588	34,615	35,684	36,815	Cont	TBD
2305 Electronics	27,105	23,524	29,075	30,446	31,379	32,351	33,380	Cont	TBD
2306 Structural Materials	10,336	11,911	12,464	13,075	13,492	13,926	14,386	Cont	TBD
2307 Fluid Mechanics	13,807	12,451	15,227	15,966	16,469	16,992	17,547	Cont	TBD
2308 Propulsion	10,913	11,878	12,965	13,601	14,033	14,484	14,960	Cont	TBD
2309 Terrestrial Sciences	10,776	25,000	4,605	4,855	5,027	5,207	5,397	Cont	TBD
2310 Atmospheric Sciences	8,194	7,165	9,392	9,864	10,186	10,520	10,875	Cont	TBD
2311 Space Sciences	5,804	6,958	6,880	7,237	7,480	7,734	8,002	Cont	TBD

Program Element: #0601102F
PE Title: Defense Research Sciences
Budget Activity: #1, Basic Research
Old Budget Activity: #1, Technology Base

Date: February 1994

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2312 Biological Sciences	11,446	14,782	19,886	20,840	21,485	22,160	22,873	Cont	TBD
2313 Human Performance	9,983	9,856	12,232	12,835	13,244	13,671	14,122	Cont	TBD
4113 Science and Engineering Education Programs	13,696	14,461	16,532	17,327	17,870	18,436	19,035	Cont	TBD
4161 Defense Technical Information Fund	12,338	12,176	0	0	0	0	0	Cont	TBD
4284 Astronomy-Oriented Science Center	16,481	0	0	0	0	0	0	0	16,481
Total	232,846	234,830	235,805	247,177	254,916	262,979	271,513	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Basic Research program, managed by the Air Force Office of Scientific Research (AFOSR), supports Air Force research efforts comprised of in-house investigations in Air Force laboratories and extramural activities in academia and industry. The program element funds broad-based scientific and engineering basic research in technologies critical to the Air Force mission. These technologies include aerospace structures, aerodynamics, materials, propulsion, power, electronics, computer science, directed energy, conventional weapons, life sciences, and terrestrial, atmospheric, and space sciences. All projects are coordinated through the Project Reliance process to harmonize efforts, eliminate duplication, and ensure the most effective use of funds. All technology areas are subject to long-range research planning and technical review by Tri-Service Scientific Planning Groups that interface with and support the twelve Technology Panels of the Joint Directors of Laboratories (JDL).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 2301, Physics: This project provides scientific information to provide technology for future Air Force problems in new weapon systems development, electromagnetic countermeasures, nuclear weapons effects, communications, nondestructive and nonintrusive testing and analysis, and new materials development. Research is supported in Photonic Physics, Optics, Plasma Physics, Atomic and Molecular Physics, and X-ray Physics.

(U) FY 1993 Accomplishments:

- (U) Produced joint University of New Mexico/Phillips Lab on-site studies of a powerful Russian high power microwave (HPM) device. Developed a unique excimer laser system. A laser materials processing program has led to a successful micro-machining product with

Program Element: #0601102F
PE Title: Defense Research Sciences
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major sales to military and commercial customers. Conceived and demonstrated high power, high repetition rate, optical fiber, soliton lasers. These are of great importance for high data rate information highways. ($18,456K)

(U) FY 1994 Planned Program:
- (U) Establish a cooperative program with the Navy under Project Reliance for a groundbreaking vacuum electronics technology transition program between industry and the academic community. Research active and nonlinear optical adaptive telescopes (especially enhanced field of view) for space object imaging and identification and conduct research on converting existing, high quality lasers to particular wavelengths for applications to high definition, large area, and head mounted displays. ($17,492K)

(U) FY 1995 Planned Program:
- (U) Study adaptive feedback techniques for boosting reliability and lowering manufacturing cost of vacuum microwave devices and study new concept infrared lasers for use in infrared countermeasures. Demonstrate laser instrumentation for monitoring applications in flexible manufacturing and nondestructive evaluation and plan to transfer a laser chemical microelectronic project. ($20,720K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Wright Laboratory, Wright-Patterson AFB, OH, and Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Stanford University, Stanford, CA; University of New Mexico, Albuquerque, NM; University of Arizona, Tucson, AZ; University of Maryland, College Park, MD; and University of Southern California, Los Angeles, CA.

(U) Related Activities:
- (U) 0602203F, Aerospace Propulsion.
- (U) 0602601F, Phillips Laboratory.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2302, Solid Mechanics and Structures: Research is conducted in structural dynamics, mechanics of materials, particulate mechanics, and structural mechanics. The anisotropy, inhomogeneity, and damage characteristics of these aerospace materials dictate the development of new solid mechanics and structural principles which are critical for performance prediction and material synthesis. Research in structures includes nonlinear dynamics aeroelastic smart structures, fluid/structural mechanics, and damage mechanisms. Extreme service environment (space, blast, thermal, and electric-magnetic field) that these structural systems must experience has made the development of fundamentals of solid mechanics theory a necessity.

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(U) FY 1993 Accomplishments:
- (U) Developed models for soil transport and resulting fate of chemicals in the environment. Modeled the stresses and strains around fibers and in the fiber/matrix interface regions in composite materials. Modeled creep deformation and identified source of internal damage in metal-matrix composites. Also modeled aeroelastic response of composite aircraft wings subjected to flight loading. ($11,654K)

(U) FY 1994 Planned Program:
- (U) Model and characterize the thermomechanical behavior of metal-matrix and intermetallic-matrix composite materials at elevated temperature in harsh environments. Study the behavior of aging aircraft structures, including those having multiple-site cracking and corrosion damage. Model the effect of chemical transport through soils to determine the rate at which hazardous chemicals contaminate surrounding environments and develop new models of fluid-structure interaction that more accurately account for the effect of deformable structures. ($12,548K)

(U) FY 1995 Planned Program:
- (U) Study the effect of environment on polymer-matrix composites, including high-temperature composites such as graphite/polyimides. Develop life-prediction models for aircraft structures subjected to combined chemical and mechanical degradation. Research adaptive structures which integrate sensors and actuators for detection and mitigation of damage in aerospace structures. Study the mechanics of functionally graded materials, which can be tailored for a particular aerospace application. ($13,180K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Wright Laboratory, Wright-Patterson AFB, OH, and Phillips Laboratory, Kirtland AFB, NM. The top contractors or univeristies are: Northwestern University, Evanston, IL; University of California, Berkeley, CA; Purdue University, West Lafayette, IL; Virginia Polytechnic Instituite, Blacksburg, VA; and University of Illinois, Urbana, IL.

(U) Related Activities:
- (U) 0602102F, Materials.
- (U) 0602201F, Aerospace Flight Dynamics.
- (U) 0602206F, Civil Engineering and Environmental Quality.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0601102F
PE Title: Defense Research Sciences
Budget Activity: #1, Basic Research
Old Budget Activity: #1, Technology Base

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3. (U) Project 2303, Chemistry: Research in chemistry seeks the knowledge and understanding required to develop new materials as well as improved means to synthesize existing materials. Research structural and electronic materials, electromagnetic and conventional weaponry, and new propellants. Research synthesis and characterization of higher performance and lower cost nonmetallic materials for application as structural composites, lubricants, and sealants. Unique chemical approaches characterize polymeric and elastomeric materials, ceramics, glass, semiconductors, and composite structures. Study atomic-level surface interactions that can limit performance of electronic devices and lubricant materials. Investigations of molecular energy release mechanisms and energy storage in metastable molecular systems foster advances in laser weapons development and new chemical propellants.

(U) FY 1993 Accomplishments:
- (U) Developed nonlinear optical polymers with performance equivalent to the best state-of-the-art (lithium niobate) materials and at a projected 1% of the current manufacturing costs. This application is targeted at low-cost, efficient information processing. Developed new chemical and photochemical infrared lasers for future use as on-board countermeasure equipment against infrared (IR)-seeking ground-to-air and air-to-air missiles. Evaluated new biotechnology-based microorganisms to be used as environmentally compatible agents for the disposal of paint striping waste products and discovered new high performance, high temperature (700%) fluorocarbon ether-based lubricants for application in advanced turbine engines. ($25,309K)

(U) FY 1994 Planned Program:
- (U) Initiate research to apply the mathematical theory of optimization to the "up front" design of polymers for optimum properties. Study catalysts to convert waste heat from aircraft to higher energy "endothermic" fuels, and for decomposition of these advanced fuels to prevent clogging of fuel inlets. Research the processes needed to preserve the high energy content of rocket fuels pending combustion, such as isolation in stabilized matrices/clusters. ($25,191K)

(U) FY 1995 Planned Program:
- (U) Investigate fuel combustion under super critical conditions as an enhancement of turbine performance. Research explosive materials with focus on molecular designs that retain high energy content, but have reduced shock sensitivity. Continue research on improved, environmentally acceptable fire suppressant to replace the currently used halon and develop high performance lubricating coating for solids at high temperatures. Continue research to apply the mathematical theory of optimization to the "up front" design of polymers for optimum properties. ($30,567K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Wright Laboratory, Wright-Patterson AFB, OH, and Phillips Laboratory, Kirtland AFB, NM. The major contractors are: California Institute of Technology, Pasadena, CA; Cornell University, Ithaca, NY; Massachusetts Institute of Technology, Cambridge, MA; SRI International, Menlo Park, CA; and University of California, Los Angeles, CA

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PE Title: Defense Research Sciences
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Old Budget Activity: #1, Technology Base

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(U) Related Activities:
- (U) 0602102F, Materials.
- (U) 0602601F, Phillips Laboratory.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 2304, Mathematics and Computer Sciences: This research focuses on mathematical modeling, simulation, and control of complex systems and to provide analytical and computational methods. Topics include: effective utilization of high-performance computers; control of aerospace systems; models and computational tools for the design of aircraft, missiles, or other weapons; efficient production of large-scale, well-documented computer programs and software; communication and information theory; signal processing; artificial intelligence in surveillance systems or independent weapons; reliability and maintainability; and the allocation of resources in logistics or operational activities using ideas from optimization and linear programming theories.

(U) FY 1993 Accomplishments:
- (U) Developed efficient homotopy methods for solving large, coupled sets of nonlinear equations, a critical mathematical problem arising in the design of large flexible space structures, large-scale circuit simulations, solid modeling for design of manufacturing parts, and in numerous other Air Force application areas. Developed a rational means of mathematically accounting for the wall interference effects that accompany model tests in wind tunnels. This methodology will permit a better prediction of drag coefficients from wind tunnel testing, especially in the transonic test regime. Developed a translation technology methodology that permits the sharing and exploitation of knowledge stored in diverse data and knowledge bases. Formulated a new mathematical theory for describing interconnection networks arising in computer communication networks. This theory enabled reduced complexity networks to be developed with concomitant cost reduction and increased efficiency. ($26,548K)

(U) FY 1994 Planned Program:
- (U) Research parallel numerical methods of stable chemical structures. This will allow a more systematic approach to the design of nonlinear optical materials. Investigate methods for optimizing communication efficiency and distributed processing performance among smart sensors for integrated identification/surveillance systems. Research parallel algorithms to support three-dimensional computational plasma physics modeling. This type of modeling will permit analysis of high power microwave and electromagnetic pulse devices. ($29,437K)

(U) FY 1995 Planned Program:
- (U) Investigate models of discrete event dynamical systems to facilitate the development of more dynamic and responsive planning systems. Research parallel multiresolution algorithms capable of predicting the long time dynamics of physical dissipative systems over a broad

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range of physical scales. Improved artificial boundary conditions will be developed that permit truncation of the computational domain and, as a consequence, the expanded use of numerical methods for the accurate computation of time domain electromagnetics signatures. ($32,080K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Rome Laboratory, Griffiss AFB, NY, Wright Laboratory, Wright-Patterson AFB, OH, and Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Massachusetts Institute of Technology, Cambridge, MA; University of Illinois, Urbana, IL; University of Maryland, College Park, MD; University of North Carolina, Chapel Hill, NC; and University of Wisconsin, Madison, WI.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0602702F, Command, Control, and Communications.
- (U) PE 0603728F, Advanced Computer Technology.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 2305, Electronics: Research electronic devices and systems that enable new Air Force capabilities such as battle information management systems, countermeasures, sensors, and the more electric aircraft concept. The goals are to increase the data and information processing speed of electronic systems, to firmly control their complexity and reliability, and to improve the security and reliability of information and data transmission. Research electronic processes which will enable the engineer to model and predict performance of electronic materials, devices, and systems. Research semiconductor materials and devices for high-speed digital and analog signal processing, microwave and millimeter wave signal and power generation, microwave tubes, superconducting analog signal processing, optical signal processing for target recognition and terminal guidance, and nuclear radiation hardening of circuits and devices.

(U) FY 1993 Accomplishments:
- (U) Confirmed discovery of and fabricated high-quality specimens of new, higher-transition-temperature superconductor, and then set new world record of 147K (under pressure) for highest known transition temperature. Produced silicon nitride-gallium arsenide electronic heterostructures with record high quality interface. This promises metal insulator semiconductor (MIS) devices for high power microwave sources. Developed an analogic array computer on which programs can be stored and executed, making it the analogic neuromorphic equivalent of the digital microprocessor. Demonstrated a continuous temporal sequence correlator operating at Gigabit per second data rates based on time domain access to memory data stored in persistent spectral hole burning medium. Demonstrated the synthesis of large

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zinc germanium phosphide laser crystals for revolutionary, broadly tunable infrared laser systems and established desorption mass spectrometry as a technique to enhance electronic material crystal quality. ($27,105K)

(U) FY 1994 Planned Program:
- (U) Demonstrate ultra-high-speed memory and logic elements using single-electron transistors (SET). Exploit large electro-optic effect of non-stoichiometric gallium arsenide (GaAs) for high density optical memory. Study fundamental femtosecond physical processes and hot electron dynamics in semiconductors. Transfer parallel processing optoelectronic devices and architectures being developed for use in asynchronous transfer mode (ATM) switching nodes to real-time parallel image processing applications and plan research on nanoscopic processing of electronic and photonic thin film materials. ($23,524K)

(U) FY 1995 Planned Program:
- (U) Investigate widebandgap semiconductor materials for high power microwave sources. Study the use of optical diagnostic techniques for discerning characteristics of boundary layer turbulence aerodynamics. Research wide bandgap semiconductors for high temperature electronics, blue emitters, recording and optical pumping sources and evaluate fundamental material and reliability issues related to ideal metallization, ohmic contacts, and Schottky barriers. ($29,075K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Rome Laboratory, Griffiss AFB, NY, Wright Laboratory, Wright-Patterson AFB, OH, and Phillips Laboratory, Kirtland AFB, NM. The major contractors are: University of California, Santa Barbara, CA; University of California, Berkeley, CA; University of Southern California, Los Angeles, CA; University of Texas, Austin, TX; and University of Illinois, Urbana, IL.

(U) Related Activities:
- (U) 0602204F, Aerospace Avionics.
- (U) 0602702F, Command, Control, and Communications.
- (U) 0603728F, Advanced Computer Technology.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

6. (U) Project 2306, Structural Materials: Materials research provides the knowledge for improving the performance, cost, and reliability of structural materials. Structural materials research studies a broad range of material properties such as strength, toughness, fatigue resistance, and corrosion resistance of airframe, turbine engine, and spacecraft materials. Emphasis is on refractory alloys, intermetallics, metal and ceramic matrix composites, advanced alumina systems, silicon carbide, silicon nitride, and carbon/carbon. Research in new processing methods complements

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research on materials properties. Direct goals of this program are to increase the operating temperature and thrust-to-weight ratio of engines, develop improved aerospace vehicle structural materials, and control or eliminate advance material reliability issues related to high temperature strength, toughness, fatigue, and environmental conditions.

(U) FY 1993 Accomplishments:
- (U) Achieved the successful synthesis of nanocrystalline powders and coatings of niobium aluminide intermetallic materials. These materials have the potential to provide substantial increases in operating temperature and decreases in component weight for gas turbine engines. Developed a model for the high temperature deformation of nickel aluminide intermetallic materials. This model will aid in the improvements of these materials for future use in advanced engine applications. Performed experiments in interface doping that resulted in a dramatic improvement in the high temperature strength of alumina-based ceramics and achieved a basic understanding of frequency dependence in the fatigue resistance of ceramic matrix composites. ($10,336K)

(U) FY 1994 Planned Program:
- (U) Explore new concepts to provide increased damage tolerance to a third generation of intermetallic materials which show potential for operations at elevated temperatures. Research processing of ceramic material through oxidation of metallic precursors. Continue studies of nanocrystalline metallic and ceramic structural materials focusing on processing, property mechanisms, characterization, and material stability. Research the relationship between the compositional and microstructural features of metals and ceramics and their physical, chemical, and mechanical properties. ($11,911K)

(U) FY 1995 Planned Program:
- (U) Investigate processing approaches to the synthesis of functionally graded materials with emphasis on achieving balanced mechanical properties. Research microstructural mechanisms controlling mechanical performance of nanocrystalline metailic materials. Investigate high-temperature fracture mechanics, static and dynamic fatigue, and mechanisms of surface strengthening of monolithic and composite ceramic materials. Research oxidation-resistant ceramic coatings for carbon/carbon materials and investigate the environmental effects of processing/property relationships of polymeric-matrix and carbon/carbon composites materials. ($12,464K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Wright Laboratory, Wright-Patterson AFB, OH, Rome Laboratory, Griffiss AFB, NY, and Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Southwest Research Institute, San Antonio, TX; University of Illinois, Urbana, IL; University of Michigan, Ann Arbor, MI; and University of California, (Berkeley, Davis, Santa Barbara, and Irvine), CA.

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(U) Related Activities:
- (U)0602102F, Materials.
- (U)0603211F, Aerospace Structures.
- (U)0708011F, Manufacturing Technology.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

7. (U) Project 2307, Fluid Mechanics: This research provides fundamental knowledge and methodologies for improving the efficiency, effectiveness, and reliability of aerospace vehicles. Performs research to provide an understanding of key fluid flow phenomena, improve theoretical models for aerodynamic prediction and design, and originate flow control concepts and predictive methods to expand current flight performance boundaries. Research includes the development of computational methods for complex flows, prediction of real gas effects in high-speed flight, control and prediction of turbulence in flight vehicles, propulsion systems, aero-optic applications, the dynamics of unsteady and separated flows, thrust vectoring and high lift concepts associated with enhanced performance and maneuverability, and heat transfer and compressor instabilities in gas turbine engines.

(U) FY 1993 Accomplishments:
- (U) Demonstrated fluidic jet control concepts to achieve vectored thrust. Achieved new scaling laws and drag reduction in actively controlled wall jets. Demonstrated control of vortex breakdown using unsteady blowing and vortex generators. Reduce gas turbine end-wall heat transfer by novel control techniques and determined supersonic swept wing boundary layer stability by using newly developed parabolized stability equation (PSE) methods. ($13,807K)

(U) FY 1994 Planned Program:
- (U) Research boundary layer transition on supersonic and hypersonic flight vehicles. Study nonlinear buffet and limit cycle oscillations in the transonic nonlinear regime. Explore methods for controlling vortex breakdown with leading and trailing edge boundary manipulation concepts. Develop turbulence models which include the effects of compressibility for application to complex high-speed aerodynamics and heat transfer. Explore micro electromechanical systems approaches for advanced flow sensors and actuators and develop predictive methods for three-dimensional flows about multiple flight vehicles/stores undergoing dynamic maneuver. ($12,451K)

(U) FY 1995 Planned Program:
- (U) Investigate active heat transfer reduction concepts in wall jet flows. Develop theory of trailing edge receptivity and explore active control concepts for supersonic jet screech suppression. Investigate dynamic aerothermoelastic effects associated with supersonic and hypersonic

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maneuvering flight vehicle configurations. Study materials processing fluid dynamics research within thermofluids area. Research unsteady aeroelasticity in gas turbine compressors emphasizing inlet-compressor interactions. ($15,227K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Wright Laboratory, Wright-Patterson AFB, OH, and Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Massachusetts Institute of Technology, Cambridge, MA; Princeton University, Princeton, NJ; Stanford University, Stanford, CA; University of California at Los Angeles, Los Angeles, CA; and the University of Arizona, Tucson, AZ.

(U) Related Activities:
- (U) 0602102F, Materials.
- (U) 0602201F, Aerospace Flight Dynamics.
- (U) 0602203F, Aerospace Propulsion.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

8. (U) Project 2308, Propulsion: Investigates the efficient utilization of energy in airbreathing engines and chemical and non-chemical rockets. Research is organized into the areas of chemically reacting flow, non-chemical energetics, and diagnostics. Chemically reacting flows involve complex coupling between energy release through chemical reaction and the flow processes which transport chemical reactants, products, and energy. Non-chemical energetic systems include plasma and beamed energy propulsion for orbit raising space missions and efficient ultra-high energy thermionic systems for space-based energy utilization. Thermal management of spaced-based power and propulsion systems will be addressed. Research in diagnostics supports the first two areas by providing critically needed measurement capabilities for processes such as spray and solid propellant combustion, and plasma propulsion.

(U) FY 1993 Accomplishments:
- (U) Identified and successfully correlated shear layer behavior by modified Mach Number based on flame speed and thermal energy release effect on fuel-air mixing behavior. Developed three-dimensional numerical simulation which identifies turbulence transition mechanism in compressible reacting shear layers. Formulated soot formation model predicting soot growth and radiative emission in flames which was validated by premixed flame experiments. Measured molecular mixing in gaseous flows by using asetone-sensitized biacetyl phosphorescence. Measured cathode surface temperatures in arcjets using infrared spectroscopy revealing cathode erosion processes. Developed models to predict supercritical rocket chamber effects on combustion instabilities. Identified physical mechanisms responsible for Hewitt correlation in impinging injectors. ($10,913K)

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(U) FY 1994 Planned Program:
- (U) Study degenerate four-wave mixing and laser-induced fluorescence for plasma measurements. Research droplet and spray behavior to include the coupling between sprays and the appearance of instabilities in liquid-fueled rockets, and the dispersion of nondilute sprays in gaseous turbulent shear layers. Investigate fuel droplet behavior at resolutions smaller than the droplet size to explore the phenomenon of turbulence modulation by droplets and extend quantitative multidimensional imaging techniques to time-resolved measurements in three dimensions and the characterization of plasmas. ($11,878K)

(U) FY 1995 Planned Program:
- (U) Conduct numerical experiments on stabilization of oblique detonation waves. Investigate supercritical fuel behavior, and computational and experimental studies of droplet dispersion, vaporization, and combustion in turbulent jets. Research gas mixing in preburner chambers to study combustion instability in liquid-fueled rockets and platelet injector dynamics, and continue experimental and numerical investigation of thrusters for orbit maneuvering and station keeping. ($12,965K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Phillips Laboratory, Kirtland AFB, NM, and Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: California Institute of Technology, Pasadena, CA; Massachusetts Institute of Technology, Cambridge, MA; Pennsylvania State University, University Park, PA; Princeton University, Princeton, NJ; and Yale University, New Haven, CT.

(U) Related Activities:
- (U) 0602102F, Materials.
- (U) 0602203F, Aerospace Propulsion.
- (U) 0602601F, Phillips Laboratroy.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

9. (U) Project 2309, Terrestrial Sciences: Provide fundamental research in seismology. Basic research in seismology is required to understand the propagation through the earth of seismic waves caused by underground explosions and to locate the source of such events. Research is required to identify seismic signatures which can be used to discrimiate between natural events (for example, earthquakes) and explosions and other man-caused events. This research will provide an improved seismic monitoring capability required to effectively monitor compliance with nuclear test ban treaty agreements and will also help detect nuclear proliferation by improving the detection and identification of small nuclear tests.

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PE Title: Defense Research Sciences
Budget Activity: #1, Basic Research
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed ground motion investigation in the area surrounding the Vandenberg Air Force Base, CA, and the China Lake Naval Air Weapons Station, CA, including coseismic observations of the Landers and Big Bear, CA, earthquakes. Demonstrated a new method for discriminating between earthquakes and underground explosions at regional distances, given a tectonic model for the region of interest. Performed discrimination experiments in a Russian surface mine to establish the seismic signature for real, non-intruded quarry blasts. Investigated the earth crust and upper mantle seismic velocity structure in a region of Kazakhstan for the purpose of event location modeling. Explored the relationship between layering in the upper mantle and shear wave anisotropy which influences the travel times of seismic wave forms. Investigated wave propagation and source mechanisms for small Eurasian events; data recorded at the Garm seismic station in Tadjikistan. Investigated crustal structures, in this case the Barents Basin, which are suspected of blocking or scattering a particular seismic wave form. ($10,776K)

(U) FY 1994 Planned Program:
- (U) Support the Joint Seismic Program (JSP) and the Global Seismic Network (GSN). Research efforts to discriminate between nuclear underground tests and other types of underground or surface explosions. Research how to more accurately determine location and depth of natural and man-made underground events. ($25,000K)

(U) FY 1995 Planned Program:
- (U) Investigate seismic signatures of all natural and man-made events which require discriminants in order to identify underground nuclear tests with high reliability and investigate near source phenomena coupled with host rock rheology and cavity characteristics to establish non-ideal effects on magnitude estimation. ($4,605K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Phillips Laboratory, Hanscom AFB, MA. The major contractors are: California Institute of Technology, Pasadena, CA; Harvard University, Cambridge, MA; Columbia University, New York, NY; Massachusetts Institute of Technology, Cambridge, MA; Princeton University, Princeton, NJ; and the Incorporated Research Institutions for Seismology (IRIS), Rosslyn, VA.

(U) Related Activities:
- (U) 0602601F,Geophysics Laboratory.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

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PE Title: Defense Research Sciences
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10. (U) Project 2310, Atmospheric Sciences: This research includes the physics, dynamics, and chemistry of processes that determine the structure and variability of the earth's atmosphere. Atmospheric properties such as wind, density, clouds and precipitation, ionization, and optical/infrared (IR) transmission/emissivity all affect the performance of Air Force systems. Research includes new measurement techniques and the development of models for specifying and predicting weather and other atmospheric conditions. Emphasis is placed on understanding atmospheric effects on optical and IR weapon systems, and on understanding the dynamics and structure of the ionosphere that affect communications and surveillance systems. Major research efforts focus on ionospheric dynamics, mesoscale meterology, and cloud prameteization and prediction.

(U) FY 1993 Accomplishments:
- (U) Identified theoretical relationship describing the wavelength dependence of radar reflectivity from lightning induced plasma. Developed algorithms to incorporate super cooled liquid into mesoscale model for purpose of forecasting aircraft icing conditions. and utilized Air Force worldwide cloud database to develop empirical relationship between relative humidity profiles and profiles of fractional cloud cover. Initiated a major study of the natural ionosphere and its impact on Air Force systems. ($8,194K)

(U) FY 1994 Planned Program:
- (U) Research mesoscale meteorology for improving numerical models of battlefield-scale forecasts. Research the coupling of the atmosphere's fluid behavior with its chemistry, especially in the middle/upper atmosphere. Study artificially disturbed ionosphere. This study is vital to the development of improved optical and infrared technology. ($7,165K)

(U) FY 1995 Planned Program:
- (U) Research satellite data retrieval algorithms and improved utilization of multispectral sensing methods, develop improved understanding of upper atmosphere, and research characteristics of plasma disturbances. Research more accurate molecular parameters and aerosol models for an enhanced understanding of molecular/particle radiation interaction and effects on Air Force systems. ($9,392K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Massachusetts Institute of Technology, Cambridge, MA; Colorado State University, Fort Collins, CO; Boston University, Boston, MA; Northwest Research Associates, Bellevue, WA; and Pennsylvania State University, State College PA.

(U) Related Activities:
- (U) 0305160F, Defense Meteorological Satellite Program.
- (U) 0602601F, Phillips Laboratory.
- (U) 0603220C, Surveillance, Acquisition, Tracking, and Kill.

(U) Other Appropriation Funds: Not Applicable

Program Element: #0601102F
PE Title: Defense Research Sciences
Budget Activity: #1, Basic Research
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) International Cooperative Agreements: Not Applicable.

11. (U) Project 2311, Space Sciences: The objective of this project, previously called Astronomy and Astrophysics, is to provide basic knowledge of the space environment and solar activity for the design and calibration of advanced Air Force systems. The project also supports the Air Weather Service (AWS) by improving observing and forecasting techniques that support operational military systems. Theoretical and empirical descriptions and models of the electrodynamics of the sun and the earth's magnetosphere, which are critical elements of future AWS prediction models and radiation belt codes, are being investigated.

(U) FY 1993 Accomplishments:
- (U) Successfully performed the first ever validation of solar interferometric imaging capability, an important milestone for Air Force solar observations and for optical surveillance. Developed model for stimulated radiation belt and active control of the energetic particle populations which cause degradation of Air Force satellite systems. Determined how the plasma sheet boundary layer of the earth's magnetosphere couples electromagnetic energy into the ionosphere, which contributes to space environmental models under development for the Air Force Space Forecasting Center. Identified a solar coronal shock as the source of gamma ray emission, a result consistent with a shock acceleration scenario for the solar energetic particles that pose a threat to Air Force Command, Control, Communications, and Intelligence (C^3I) space assets. ($5,804K)

(U) FY 1994 Planned Program:
- (U) Validate kinematic and magnetohydrodynamic codes to predict solar active region dynamics to predict solar threats to Air Force/ Department of Defense assets. Determine the transport and loss of solar particles in the solar wind, the interplanetary medium, and across the earth's magnetosphere boundary to establish design criteria for satellite shielding and for predictions needed for Air Force communications. Test a new theory of electron beam production by electromagnetic waves for space-based, very low frequency propagation for secure, long-range communication applications. ($6,958K)

(U) FY 1995 Planned Program:
- (U) Combine kinematic models of solar convection and three-dimensional magnetohydrodynamic simulations for solar activity forecasting. Validate time dependent models of magnetic storm effects with Air Force and National Aeronautics and Space Administration satellite data and ground-based sensors and determine the effects that limit propagation efficiency and the performance of satellite charge control systems and ballistic missile defense systems. ($6,880K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Associated Universities for Research in Astronomy, Sacramento Peak Observatory, NM; Columbia University, New York, NY; Stanford University, Stanford, CA; Johns Hopkins University, Laurel, MD; and Dartmouth College, Hanover, NH.

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PE Title: Defense Research Sciences
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Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Related Activities:
- (U) 0602601F, Phillips Laboratory.
- (U) 0602702F, Command, Control, and Communications.
- (U) 0603410F, Space System Environment.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

12. (U) Project 2312, Biological Sciences: This project consists of three research areas: environmental and general toxicology and effects of biohazards; neuroscience; and chronobiology. Environmental toxicology or environmental quality research has been expanded in order to provide the basic understanding of the fate and effects of Air Force chemicals and materials on the environment. This understanding is required in order to develop efficient and cost-effective strategies to clean up contaminated sections of air bases and to mitigate future environmental contamination due to Air Force operations. Knowledge of the mechanisms by which Air Force chemical and physical agents can cause toxic responses in organisms will allow the development of procedures to prevent and predict toxicity and provide strategies for the development of new materials that will not be harmful to man or the environment. Basic research in neuroscience and chronobiology will result in new strategies to prevent G-induced loss of consciousness in pilots, impaired performance due to jet-lag and shift-work, night operations, and the loss of life and aircraft due to stress, inattention, or lack of vigilance.

(U) FY 1993 Accomplishments:
- (U) Discovered select bacterial strains and developed a bioremediation process that together are capable of anaerobically degrading the rocket propellants cyclotetramethylene tetranitramine (HMX) and cyclotrimethylene trinitramine (RDX), as well as recalcitrant nitroaromatics such as trinitrotoluene (TNT), into simple and harmless products. Discovered a bacterial strain that rapidly converts the toxic perchlorate ion found in solid rocket propellant waste streams into innocuous products. Discovered a microwave-activated luminescent bacterial compound that was subsequently used (a) to develop a technique for rapid isolation and identification of anthrax, a biological warfare agent, and the tuberculosis bacterium, and (b) to map and predict microwave and radio frequency absorption patterns in humans. Determined that the brain processing underlying long-term memory is independent from that underlying short-term memory and determined that the output signal from the circadian pacemaker is likely to be humoral as well as neural. ($11,446K)

(U) FY 1994 Planned Program:
- (U) Research environmental fate, transport, biodegradation, and microbial detoxification of toxic Air Force compounds and metals. This research explores the molecular, physical, and biochemical concepts applicable to site remediation and other technology areas directed at eliminating hazardous waste. Begin research using molecular biological techniques to solve intracellular regulatory questions about circadian timing mechanisms. Continue physiological and neurochemical investigations of the brain's mechanisms for responding to

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PE Title: Defense Research Sciences
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Old Budget Activity: #1, Technology Base

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episodes of G-induced loss of consciousness, fatigue, and arousal. Determine the mechanisms involved in retinal damage induced by ultrashort laser pulses in the visible and near-infrared regions of the electromagnetic spectrum. Continue research on genetic engineering of new microbial degradation pathways that can be used to restore contaminated sites. Examine biochemical/molecular markers of toxicity and pursue advancements in physiologically-based toxicokinetics. ($14,782K)

(U) FY 1995 Planned Program:

- (U) Research biochemical concepts for site remediation and hazadous waste cleanup. Study identification and gentetic engineering of microbal degredation pathways. Research laser-induced eye damage, toxic mechanisms, and predictive toxicology. Examine the role of computer modeling in making predictive toxicology assessments for the Air Force. Research potential human toxicity of chemicals related to the formulation, synthesis, and fabrication of organic matrix composites used in the manufacture of advanced aircraft and missiles. Examine brain mechanisms underlying attention, working memory, and long-term memory in order to provide neural models for machine intelligence, continue research on the mechanisms utilized by the brain to initiate changes in state along a continuum from sleep to arousal to attentiveness, and conduct studies to determine brain mechanisms underlying human circadian rhythms. ($19,886K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Armstrong Laboratory, Brooks AFB, TX, and Tyndall AFB, FL, and at Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: Columbia University, New York, NY; John Hopkins University, Baltimore, MD; Hahnemann University, Philadelphia, PA; University of Texas, San Antonio, TX; and Massachusetts Institute of Technology, Cambridge, MA.

(U) Related Activities:

- (U) 0602202F, Human Systems Technology.
- (U) 0602205F, Personnel, Training, and Simulation.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

13. (U) Project 2313, Human Performance: This project supports basic research on the human capability to process information quickly and accurately in normal and high dynamic environments. Research personnel selection, classification, and training, and the design of modern systems for human-machine interfaces or artificial intelligence and signal processing. Includes research on vision, hearing, spatial orientation, computational neuroscience, cognition, intelligent tutoring systems, and team situational awareness. Vision research includes surface perception and pattern recognition. Hearing research includes studies of sound source segregation, localization, and recognition, including speech sounds. Spatial orientation research examines the accurate integration processes of the visual, vestibular, and other multisensory systems that humans use to orient and navigate in dynamic environments. Computational neuroscience includes study of biological neural networks as information processors.

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Old Budget Activity: #1, Technology Base

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Cognition research focuses on attention, memory, decision-making, and expert performance. Study of tutoring systems considers the efficacy of modern instructional techniques and their interactions with student abilities to determine rate of learning and level of retention. Study of teams will consider how communication supports accurate shared impressions of dynamic environments in command and control.

(U) FY 1993 Accomplishments:

- (U) Developed a new system for analyzing educational text and determining how it might be improved by editing to increase comprehension. Built and patented integrated circuit that simulates early processing used in developing a model of the auditory system. The chip will be used in research on speech recognition and the separation and localization of sounds. Built a capability for assessing the quality of the match between differential human abilities and different styles of computer-based instruction. Utilized research on computer display screens to decrease user errors by increasing the refresh rate of the display. Modeled oculomotor system performance to determine the amount of eccentricity associated with a visual saccade. Determined those day and night portions of the Desert Storm F-15 missions where spatial distortion occurred and the influence of aviation experience on its occurrence. ($9,983K)

(U) FY 1994 Planned Program:

- (U) Plan vision program to include work on metrics of fidelity for visual displays (for human interface) and active vision (for robotics). Determine individual differences in mental ability and performance (for selection and for human interface). Research team situational awareness to reach critical mass of experimenters (for human interface). Explore how G-forces (one to four) affect the onset of, and longevity of, and the illusory sensation of Visually Perceived Eye Level (VPEL). Determine processing time thresholds for visual recognition of targets and the influence of training on improving these thresholds. Investigate the main and interactive effects of the visual-otolith and visual semicircular canal systems via an off variable axis rotation device. ($9,856K)

(U) FY 1995 Planned Program:

- (U) Investigate team member fatigue and stress to determine optimum performance environments for command, control, and communications. Model human performance using computer algorithms for application to virtual environments/workstation design. Conduct cognition research to address complex decision-making. Research spatial disorientation in the Spatial Disorientation Device at the Armstrong Laboratory. Determine the sensory threshold changes associated with off variable axis rotation-induced spatial disorientation and investigate the efficacy of three-dimensional sound localization in maintaining spatial orientation and in recovery from spatial disorientation. ($12,232K)

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research with in-house research done by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: University of California, Berkeley, CA; New York University, New York, NY; Harvard University, Cambridge, MA; Johns Hopkins University, Baltimore, MD; and Massachusetts Institute of Technology, Cambridge, MA.

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(U) Related Activities:
- (U) 0602202F, Human Systems Technology.
- (U) 0603231F, Crew Systems and Personnel Protection Technology.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

14. (U) Project 4113, Science and Engineering Education Programs: This project is to stimulate scientific and engineering education and to increase the interaction between the broader research community and the Air Force laboratories. Emphasis is placed on increasing the number of U.S. citizens, especially women and minorities, with advanced degrees in science and engineering. These programs include: the Summer Faculty Research Program under which selected university faculty members conduct research at Air Force labs; the Graduate Student Research Program where graduate students in areas of interest to the Air Force perform research at Air Force labs; the University Resident Research Program where faculty members spend one year at an Air Force lab contributing to Air Force research needs and operations; the U.S. Air Force National Research Council (NRC) Resident Research Associateship Program which provides outstanding post-doctoral and senior scientists and engineers opportunities to research problems of their own choice that are compatible with the research interests of selected Air Force labs; the Laboratory Graduate Fellowship Program which is designed to stimulate doctoral candidate interest in Air Force labs and the research programs of those labs; and the National Defense Science and Engineering Graduate Fellowship Program which is jointly sponsored by the Army, Navy, Air Force, and the Advanced Research Projects Agency for the purpose of increasing the number of U.S. citizens trained in science and engineering.

(U) FY 1993 Accomplishments:
- (U) The Summer Faculty Research Program supported 187 university faculty for up to 12 weeks at Air Force labs. The Graduate Student Research Program supported 117 students for up to 12 weeks at Air Force labs. Ten percent of these Summer Research Program participants are members of a historically black or minority college. The University Resident Research Program supported 25 university researchers. The National Research Council Resident Research Associateship Program supported 50 fellows, divided evenly between senior and post-doctoral researchers. The Laboratory Graduate Fellowship Program supported 79 fellows. The National Defense Science and Engineering Graduate Fellowship Program supported approximately 75 fellowships with ten percent set aside for members of ethnic minority groups underrepresented in science and engineering. ($13,696K)

(U) FY 1994 Planned Program:
- (U) This program will continue to support scientific and engineering education programs. ($14,461K)

(U) FY 1995 Planned Program:
- (U) This program will continue to support scientific and engineering education programs. ($16,532K)

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PE Title: Defense Research Sciences
Budget Activity: #1, Basic Research
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Work Performed By: Not Applicable.

(U) Related Activities:
- (U) 0601103D, University Research Initiative.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

15. (U) Project 4161, DefenseTechnical Information Fund: This project provides the funding required to the pay the Air Force portion of the operating costs of the Defense Technical Information Center (DTIC) and the 14 Information Analysis Centers which are administered by DTIC. Beginning in FY 1995, the Air Force will no longer be responsible for providing support to DTIC.

(U) FY 1993 Accomplishments:
- (U) Funding was provided to DTIC on a monthly cycle of billing and reimbursement at a rate of one-twelfth of the total each month. ($12,338K)

(U) FY 1994 Planned Program:
- (U) Funding will be provided to DTIC on a monthly cycle of billing and reimbursement at a rate of one-twelfth of the total each month. ($12,176K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: The Defense Technical Information Center, Cameron Station, Alexandria, VA.

(U) Related Activities: Not Applicable.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

16. (U) Project 4284, Astronomy-Oriented Science Center: This project was created to execute a program for a competitive grant establishing an astronomy-oriented science center.

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PE Title: Defense Research Sciences
Budget Activity: #1, Basic Research
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1993 Accomplishments: Not Applicable.

(U) FY 1994 Planned Program:
- (U) A competitive award is expected to be made in the third quarter of FY 1994. ($16,481K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by the Air Force Office of Scientific Research. The contractor is to be determined.

(U) Related Activities: Not Applicable.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06ML Laboratory Operations	32,170	31,928	31,069	31,541	32,246	32,754	32,609	Cont	TBD
2417 Thermal Protection Materials and Structures	2,991	4,858	0*	0	0	0	0	Cont	TBD
2418 Metallic Structural Materials	15,643	15,670	0**	0	0	0	0	Cont	TBD
2419 Nonmetallic Structural Materials	4,903	4,718	0*	0	0	0	0	Cont	TBD
2420 Aerospace Propulsion Materials	4,241	4,348	0*	0	0	0	0	Cont	TBD
2421 Fluids, Lubricants, and Elastomeric Materials	2,002	1,706	0*	0	0	0	0	Cont	TBD
2422 Protective Coatings and Materials	3,479	3,151	0***	0	0	0	0	Cont	TBD
2423 Electromagnetic Windows and Electronic Materials	5,338	4,529	0***	0	0	0	0	Cont	TBD
4347 Materials and Processes for Structures, Propulsion and Subsystems	0	0	22,183	22,520	23,023	23,386	23,283	Cont	TBD
4348 Materials and Processes for Electronics, Optics and Survivability	0	0	6,923	7,028	7,185	7,299	7,266	Cont	TBD
4349 Materials and Processes Technology	0	0	9,874	10,024	10,248	10,410	10,363	Cont	TBD
Total	70,767	70,908	70,049	71,113	72,702	73,849	73,521	Cont	TBD

* Project content moved to Project 4347 in FY 1995.
** Aluminum and titanium alloy work moved to Project 4347 in FY 1995; non-destructive inspection/evaluation plus system design engineering and mechanical behavior of metallic/nonmetallic structural materials work moved to Project 4349 in FY 1995.
*** Project content moved to Project 4348 in FY 1995.

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

B (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development program develops materials, manufacturing and processing technologies, and non-destructive inspection/evaluation technology. It is the primary source of advanced materials and processes to reduce life cycle costs and improve performance, supportability, reliability, survivability, and affordability of current and future Air Force systems and support equipment. The program also provides management and operational support for the Materials Directorate, Wright-Patterson AFB, OH.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 06ML, Laboratory Operations: Provides management and operational support for the Materials Directorate, Wright-Patterson AFB, OH. Includes: pay and benefits for civilian scientists, engineers, and support personnel; travel; transportation; rents; communications; utilities; supplies and equipment; and salaries.

2. (U) Project 2417, Thermal Protection Materials and Structures: Develops advanced composite technologies for structural and thermal protection applications in aerospace systems and components which are exposed to extreme operating conditions. Typical aerospace systems and component applications include military gas turbine engines, solid rocket and space engine propulsion systems, strategic reentry and penetration aid systems, space structures, and high Mach number aerodynamic vehicles. The advanced composites improve the accuracy and survivability of missiles, increase the thrust-to-weight ratio and specific fuel consumption of turbine engines, and increase the range, payload, and durability of high-speed aircraft and missiles.

(U) FY 1993 Accomplishments:
- (U) Developed thermal resistant materials providing significant weight reduction in applications such as electromagnetic windows, heat shields, nosetips, and leading edges while retaining accurate dimensional stability for advanced strategic, tactical, and space structures. ($1,627K)
- (U) Developed processing techniques for the manufacture of affordable thermal resistant materials to improve their reproducibility, reliability, dimensional stability, and thermal efficiency for advanced strategic, tactical, and space structures. ($636K)
- (U) Developed innovative carbon applications for low-cost, lightweight, reliable, and survivable materials for advanced strategic, tactical, and space structures. ($728K)

(U) FY 1994 Planned Program:
- (U) Develop thermal resistant materials providing significant weight reduction in applications such as electromagnetic windows, heat shields, nosetips, and leading edges while retaining accurate dimensional stability for advanced strategic, tactical, and space structures. ($3,304K)
- (U) Develop processing techniques for the manufacture of affordable thermal resistant materials to improve their reproducibility, reliability, dimensional stability, and thermal efficiency for advanced strategic, tactical, and space structures. ($975K)
- (U) Develop innovative carbon applications for low-cost, lightweight, reliable, and survivable materials for advanced strategic, tactical, and space structures. ($579K)

(U) FY 1995 Planned Program: Not Applicable.

Program Element: #J602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Martin Marietta Astronautics Group, Denver, CO; SPARTA Inc., San Diego, CA; Nichols Research Corp., Albuquerque, NM; Lockheed Missile and Space, Sunnyvale, CA; and Textron Defense Systems, Wilmington, MA.

(U) Related Activities:
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0708011F, Manufacturing Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2418, Metallic Structural Materials: Develops advanced metallic materials and metal matrix composites with optimum combination of properties from cryogenic temperatures to 1800°F (600°F increase in current capability) for use in tactical and strategic aircraft, turbine engines, and missile primary structures. Develops the processes for the fabrication of these metallic materials. Investigates engineering properties and repair technologies and automated computer systems and databases to reduce weapon production costs. This project also provides quick response solutions and failure analyses to the major commands, product divisions, and accident investigation teams. Metallic materials and metal matrix composites (MMCs) being developed are essential to achieving the doubled thrust-to-weight goal of the Integrated High Performance Turbine Engine Technology (IHPTET) program. The repair technologies and non-destructive inspection/evaluation (NDI/E) capabilities being developed increase supportability and sortie generation.

(U) FY 1993 Accomplishments:
- (U) Developed ultra-lightweight and high temperature metallic materials with properties optimized for aerospace applications to provide significant improvements in aircraft and spacecraft affordability, survivability, maintainability, and performance. ($6,084K)
- (U) Developed processes and techniques for NDI/E of aging metallic systems to improve capabilities for detection of hidden corrosion and multi-site damage in aerospace systems. ($2,486K)
- (U) Developed environmentally compliant and non-toxic materials for aerospace applications. ($1,149K)
- (U) Developed and exercised advanced techniques for metallic material joining and fastening, durability testing, and failure mechanism analysis to improve the transition, application, and support of these materials when used in aerospace systems. ($5,924K)

(U) FY 1994 Planned Program:
- (U) Develop ultra-lightweight and high temperature metallic materials with properties optimized for aerospace applications to provide significant improvements in aircraft and spacecraft affordability, survivability, maintainability, and performance. ($5,603K)

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Develop processes and techniques for non-destructive inspection/evaluation of aging metallic systems to improve capabilities for detection of hidden corrosion and multi-site damage in aerospace systems. ($2,309K)
- (U) Develop environmentally compliant and non-toxic materials for aerospace applications. ($963K)
- (U) Develop and exercise advanced techniques for metallic material joining and fastening, durability testing, and failure mechanism analysis to improve the transition, application, and support of these materials when used in aerospace systems. ($6,795K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Universal Energy Systems Inc., Dayton, OH; Northrop Corp., Hawthorne, CA; Rockwell International, Thousand Oaks, CA; Lockheed Aeronautical Systems, Los Angeles, CA; and Case Western Reserve University, Cleveland, OH.

(U) Related Activities:
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0708011F, Manufacturing Technology.
- (U) DOD Metal Matrix Composite Steering Group.
- (U) Office of Science and Technology Committee on Materials Working Group on Non-Destructive Materials.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 2419, Nonmetallic Structural Materials: Develops advanced polymeric matrix composite (PMC) materials with properties suitable for use over the temperature range from crycgenic temperatures to 700°F for structural applications in Air Force subsonic and supersonic aircraft, satellites, and missile systems. Emphasis is on constantly increasing strength, stiffness, temperature capability, and durability of PMCs as well as reducing weight and the costs to process them. This emphasis also includes the development of signature reduction materials, ordered polymer films, and molecular composites. New PMCs are expected to translate a 50% weight savings over traditional PMC structures, which will improve overall system range and payload capability.

(U) FY 1993 Accomplishments:
- (U) Developed affordable, lightweight, thermal resistant nonmetallic materials and processing techniques for application to aircraft structures, and developed subsystems that will allow significant improvements in aircraft affordability, survivability, maintainability, and performance. ($3,176K)
- (U) Developed non-intrusive evaluation processes and materials for improved assessment of nonmetallic structural materials components during fabrication and use. ($1,727K)

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop affordable, lightweight, thermal resistant nonmetallic materials and processing techniques for application to aircraft structures, and develop subsystems that will allow significant improvements in aircraft affordability, survivability, maintainability, and performance. ($2,904K)
- (U) Develop non-intrusive evaluation processes and materials for improved assessment of nonmetallic structural materials components during fabrication and use. ($1,814K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: the University of Dayton, Dayton, OH; Pratt and Whitney Aircraft, West Palm Beach, FL; Northrop Corporation, Hawthorne, CA; McDonnell Aircraft, St. Louis, MO; and Systems Research Laboratory, Dayton, OH.

(U) Related Activities:
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0708011F, Manufacturing Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 2420, Aerospace Propulsion Materials: Develops ceramic matrix composites (CMCs), advanced intermetallic alloys, and metal matrix composites (MMCs), as well as the processes for fabricating these materials. These materials will be used to make lighter weight uncooled turbine engine components capable of operating in oxidizing environments at temperatures greater than 2800°F for the required service life. This project supports the DOD/NASA Integrated High Performance Turbine engine Technology (IHPTET) initiative, which plans to double the thrust-to-weight ratio of turbine engines by the year 2003 and provide technology for improved performance of derivatives of current engines. This project improves engine producibility, durability, life cycle costs, and fuel consumption.

(U) FY 1993 Accomplishments:
- (U) Developed advanced ceramic composites for propulsion applications to double advanced propulsion and high temperature vehicle structure capabilities ($1,830K)
- (U) Developed advanced intermetallic metals and composites for propulsion applications to double advanced propulsion and high temperature vehicle structure capabilities. ($1,016K)
- (U) Developed analytical and physical process modeling techniques for advanced propulsion system materials to better understand their characteristics in order to improve their reliability and lower their acquisition and life cycle costs. ($1,395K)

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop advanced ceramic composites for propulsion applications to double advanced propulsion and high temperature vehicle structure capabilities. ($1,909K)
- (U) Develop advanced intermetallic metals and composites for propulsion applications to double advanced propulsion and high temperature vehicle structure capabilities. ($926K)
- (U) Develop analytical and physical process modeling techniques for advanced propulsion system materials to better understand their characteristics in order to improve their reliability and lower their acquisition and life cycle costs. ($1,513K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: General Electric Co., Evandale OH; Pratt and Whitney Aircraft, West Palm Beach, FL; Corning Inc., Corning, NY; Universal Energy Systems, Dayton, OH; and Saphikon Inc., Milford, NH.

(U) Related Activities:
- (U) PE 0602203F, Aerospace Propulsion.
- (U) PE 0603202F, Aircraft Propulsion Subsystem Integration.
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0603216F, Aerospace Propulsion and Power Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

6. (U) Project 2421, Fluids, Lubricants, and Elastomeric Materials: Develops advanced fluids, lubricants, seals, sealants, and fluid technologies, together with an understanding of their behavior and performance. Improves the nonflammability and low temperature fluidity of fluids and lubricants. These materials are used in aircraft propulsion and hydraulic systems, spacecraft and missile propulsion systems, and spacecraft attitude control systems. This project develops the higher temperature lubricants and seals required by the higher operating temperatures of military turbine engines being developed under the Integrated High Performance Turbine engine Technology (IHPTET) program.

(U) FY 1993 Accomplishments:
- (U) Developed advanced fluids and lubricants to enhance aeorspace system affordability, survivability, and performance. ($1,347K)
- (U) Developed advanced tribomaterials to enhance aerospace system affordability, survivability, and performance. ($655K)

(U) FY 1994 Planned Program:
- (U) Develop advanced fluids and lubricant to enhance aeorspace system affordability, survivability, and performance. ($1,139K)

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

- (U) Develop advanced tribomaterials to enhance aerospace system affordability, survivability, and performance. ($567K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: the University of Dayton, Dayton, OH; Exflour Research Corp., Austin, TX; Lubricating Specialties, Pico Rivera, CA; Phoenix Chemical Laboratory, Chicago, IL; and Pradeep Kupta Inc., Clifton Park, NY.

(U) Related Activities:
- (U) PE 0603202F, Aircraft Propulsion Subsystem Integration.
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

7. (U) Project 2422, Protective Coatings and Materials: Develops materials and protective coatings concepts to improve the survivability of aircrews and vital components of Air Force aircraft, missiles, and satellites in natural and threat environments. Materials developed in this project primarily have a protective function essential to the survival of the crew, avionics, and other critical subsystems. Types of materials developed include survivable thermal management materials for satellites which reduce the problem of contamination of spacecraft surfaces while enhancing survivability, camouflage and signature control coatings, and laser hardening materials and protective concepts. These protective materials ensure Air Force aircrews and weapon systems can carry out their missions.

(U) FY 1993 Accomplishments:
- (U) Developed advanced materials technologies that enhance laser hardening for aircrews and laser hardending and low-observability for sensors, avionics, and other electro-optical components. ($1,957K)
- (U) Developed advanced materials technologies that enhance laser hardening and low-observability for Air Force aircraft, missile, and space system structural components such as canopies, radomes, Infra-Red (IR) domes, and other structural elements. ($1,522K)

(U) FY 1994 Planned Program:
- (U) Develop advanced materials technologies that enhance laser hardening for aircrews and laser hardening and low-observability for sensors, avionics, and other electro-optical components. ($2,340K)
- (U) Develop advanced materials technologies that enhance laser hardening and low-observability for Air Force aircraft, missile, and space system structural components such as canopies, radomes, IR domes, and other structural elements. ($811K)

(U) FY 1995 Planned Program: Not Applicable.

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Science Applications International Corp., San Diego, CA; University of North Carolina, Chapel Hill, NC; Tracor, Provo, UT; Northrop Corp., Pico Rivera, CA; and General Atomics, San Diego, CA.

(U) Related Activities:
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0708011F, Manufacturing Technology.
- (U) Tri-Service Laser Hardened Materials and Structures Group.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

8. (U) Project 2423, Electromagnetic Windows and Electronic Materials: Develops high payoff materials and processes for microelectronic, microwave (MW), and millimeter wave (MMW) applications, infrared (IR) detectors, electro-optics, and IR transparencies. These materials and processes are essential for the development of reliable, higher performance integrated circuits and related components, active (radar) and passive (IR) sensors, laser-based systems, and avionics, communications, and electronic warfare (EW) systems for Air Force aircraft, munitions, and missile and space systems, and have significant dual-use payoff. Materials being developed for microelectronic, MW, and related applications are enabling technologies for higher frequency, higher power, higher reliability, and much higher operating temperature systems. Materials being developed for IR detectors will significantly extend target detection and tracking capability. Nonlinear optical (NLO) materials being developed will extend the capability of present lasers and make optical signal processing possible. Investigates high temperature materials to enable the fabrication of radio/radar circuitry with significantly higher performance for EW systems and offers the potential for greatly increased signal processing capability. High durability IR window materials will offer sustained supersonic flight survivability with greatly increased resistance to rain, sand, and dust erosion at all speeds.

(U) FY 1993 Accomplishments:
- (U) Developed advanced producible IR detector and transparency materials and processes for improved strategic and tactical surveillance, integrated photonics, and high density electronic packaging capabilities. ($1,109K)
- (U) Developed advanced producible MW and microelectronics materials and processes for improved strategic and tactical surveillance, integrated photonics, and high density electronic packaging capabilities. ($1,578K)
- (U) Developed advanced producible ultrastructure growth technology and NLO materials and processes for improved strategic and tactical surveillance, integrated photonics, and high density electronic packaging capabilities. ($2,306K)
- (U) Developed advanced producible High Temperature Superconductor materials and advanced packaging and interconnections technologies for improved strategic and tactical surveillance, integrated photonics, and high density electronic packaging capabilities. ($345K)

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop advanced producible infrared detector and transparency materials and processes for improved strategic and tactical surveillance, integrated photonics, and high density electronic packaging capabilities. ($861K)
- (U) Develop advanced producible microwave and microelectronics materials and processes for improved strategic and tactical surveillance, integrated photonics, and high density electronic packaging capabilities. ($1,534K)
- (U) Develop advanced producible ultrastructure growth technology and nonlinear optical materials and processes for improved strategic and tactical surveillance, integrated photonics, and high density electronic packaging capabilities. ($1,689K)
- (U) Develop advanced producible High Temperature Superconductor materials and advanced packaging and interconnections technologies for improved strategic and tactical surveillance, integrated photonics, and high density electronic packaging capabilities. ($445K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH Major contractors are: the University of Dayton, Dayton, OH; Canadian Commercial Corp., Ottawa, Canada; Westinghouse Research and Development, Pittsburgh, PA; Hughes Research Laboratory, Malibu, CA; and Lockheed Sanders, Nashua, NH.

(U) Related Activities:
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0602204F, Aerospace Avionics.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

9. (U) Project 4347, Materials and Processes for Structures, Propulsion, and Subsystems: Develops materials and processes for aircraft, spacecraft, and missiles with improved affordability, maintainability, and enhanced performance of current and future Air Force systems. Advanced thermal protection and carbon-carbon composites (CCC) materials are developed that are affordable, lightweight, and ablation and erosion resistant to meet the thermal and nuclear hardness requirements of future ballistic and maneuvering reentry systems. A family of affordable lightweight materials are developed, including metals, metallic and nonmetallic composites, and ceramics which can provide upgraded capability for existing aircraft, spacecraft, missile, and propulsion systems to meet the requirements for new systems beyond the year 2000. Included are turbine engine materials with operating capabilities from 1700°F to 2800°F that will enable engine designs to double the thrust to weight of 1986 engine performance capabilities. Spacecraft structural materials are developed that are lightweight, dimensionally stable, noncontaminating, and resistant to the space environment. Fluids, lubricants, seals, and other nonstructural materials are developed for the subsystems on aircraft, spacecraft, and missile systems as well as their propulsion systems.

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1993 Accomplishments. Not Applicable.

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program:
- (U) Develop carbon-carbon and thermal protection materials to improve operational capability of ballistic, strategic, and tactical systems. These materials offer significant benefits in high temperature shape retention, weight savings, and thermal conductivity properties which will lead to smaller radiators on aerospace systems and lighter and cooler space electronics packages. ($4,858K)
- (U) Develop advanced nonmetallic composite structural materials for aircraft applications including lightweight airframes, control surfaces, aircraft canopies, smart skins, and engine compressor frames and ducts, and for spacecraft applications including lightweight trusses, struts, solar arrays, antenna supports, and bus structures. These materials and processing techniques will offer significant benefits in weight savings compared with the use of traditional metallic counterparts. Advances in processing techniques will greatly reduce manufacture times and reduce both manufacturing and life cycle costs. ($4,718K)
- (U) Develop nonstructural materials (such as fluids, lubricants, seals, greases, and coatings) for improved system performance, reduced toxicity, and reduced life cycle costs. ($2,463K)
- (U) Develop affordable lightweight metallic materials that are considerably lighter than conventional aluminum and can withstand higher temperatures than currently available materials. Applications are in lighter aircraft and spacecraft structural components, and in high temperature, high performance engine components. ($5,796K)
- (U) Develop ceramic matrix composites and very high temperature metallics to enable revolutionary performance improvements in advanced propulsion systems and high temperature airframe structures. Will also develop improved processes for producing these materials to greatly reduce component costs. ($4,348K)

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are to be determined.

(U) Related Activities:
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0603211F, Aerospace Systems.
- (U) PE 0603202F, Aeropropulsion Subsystem Integration.
- (U) PE 0603216F, Aeropropulsion and Power Technology.
- (U) PE 0708011F, Manufacturing Technology.
- (U) DOD Metal Matrix Composite Steering Group.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date. February 1994

10. (U) Project 4348, Materials and Processes for Electronics, Optics, and Survivability: Develops materials and processes for optical and electro-optical devices and subsystems for aircraft, missile, and space systems. This project also develops new materials and accompanying processes for protection of aircrews, sensors, aircraft, and space systems from laser threats. Radar modules, microwave devices, infrared (IR) detectors, photonics, and optical processors are used in target detection, data processing, electronic warfare, and communications. The performance of these systems is constrained by the quality and physical characteristics of these materials and their processes. New materials and processes are developed that improve the production quality and rates to develop advanced electronic and optical materials that offer higher operating speeds, greater bandwidth density, improved thermal management, greater sensitivity, and expanded dynamic range. Protection from lasers is dependent upon the wavelength, whether the wavelength is pulsed or continuous, the ability of the enemy to vary the wavelength, as well as the susceptibility of the system. Materials and processes are developed that can withstand the high laser temperature gradients, reject damaging wavelengths, or lower response thresholds, and/or response times.

(U) FY 1993 Accomplishments: Not Applicable.

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program:
- (U) Develop new electronic and electromagnetic materials and processes for improved microwave and microelectronic technology for radar, communications, and optical processing systems. Developments will offer lower cost and higher performance systems capable of operating in more demanding thermal, atmospheric, and electromagnetic environments. ($4,529K)
- (U) Develop materials and processes to enhance the survivability of aircrews and sensor systems against laser threats. These materials will prevent costly systems losses or damage from laser irradiation. ($2,394K)

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are to be determined.

(U) Related Activities:
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603211F, Aerospace Systems.
- (U) PE 0708011F, Manufacturing Technology.
- (U) Tri-Service Laser Hardening Materials and Structures Group.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0602102F
PE Title: Materials
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

11. (U) Project 4349, Materials and Processes Technology: Develops materials and processes to provide systems and operational support to Air Force mission areas by providing techniques to assure the quality of delivered systems, transitioning more reliable and maintainable materials, establishing capability to detect and characterize performance threatening defects, eliminating the dependency on hazardous and toxic materials in repair and maintenance processes, and providing quick reaction support to the operational commands and repair centers. Non-destructive inspection/evaluation (NDI/E) methods are essential to ensure optimum quality in the design and production of aircraft, spacecraft, propulsion, and missile systems. NDI/E methods are essential to monitor and detect the onset of any service initiated damage and/or deterioration. This project develops techniques that increase the capability and reliability of currently used methods to detect and characterize performance threatening defects in metallic and nonmetallic composite structures.

(U) FY 1993 Accomplishments: Not Applicable.

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program:
- (U) Develop NDI/E techniques to evaluate and characterize damage in complex, low-observable materials and structures. Identify NDI/E techniques to inspect the integrity of metal to metal bondlines in aircraft structures. NDI/E capability improvements are essential to ensuring optimum quality in design, manufacture, and maintenance of Air Force aircraft and missile weapon systems. ($2,411K)
- (U) Develop support capabilities, information, and processes to resolve problems in the use of materials and processes or in conducting failure analysis of components. Develop a materials database for transition of Title III metal matrix composites to aerospace systems. Maintain a handbook on materials and processes guidelines for composite patching of aircraft structures. Design allowables developed for thin gage titanium alloy castings. ($7,463K)

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are to be determined.

(U) Related Activities:
- (U) PE 0603112F, Advanced Materials for Weapons Systems.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0603211F, Aerospace Systems.
- (U) PE 0708011F, Manufacturing Technology.
- (U) Office of Science and Technology Committee on Materials Working Group on Non-Destructive Materials.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602201F
PE Title: Aerospace Flight Dynamics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06FF Directorate Operations	39,144	37,317	37,891	36,396	34,966	33,599	32,295	Cont	TBD
2401 Structures	6,006	5,699	6,619	7,351	8,282	8,878	9,041	Cont	TBD
2402 Vehicle Equipment	7,926	4,064	4,720	5,242	5,907	6,331	6,448	Cont	TBD
2403 Flight Control	7,855	7,068	8,210	9,117	10,272	11,011	11,214	Cont	TBD
2404 Aeromechanics	6,456	5,257	6,606	7,281	7,640	8,190	8,340	Cont	TBD
Total	67,387	59,405	64,046	65,387	67,067	68,009	67,338	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development program develops the air vehicle technology base in aeromechanics, structures, flight control, cockpits, and vehicle subsystems to reduce life cycle costs and improve performance of existing and future air vehicles. These air vehicle technology programs offer: increased reliability, maintainability, and supportability for air vehicles and subsystems; all-weather, day/night operations; and near-realistic synthetic environments.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 06FF, Directorate Operations: This project provides for the management, support, and operation of the Flight Dynamics Directorate of Wright Laboratory, Wright-Patterson AFB, OH. It provides for: the pay and related costs for civilian scientists, engineers, and support personnel; transportation of equipment; communications and utilities costs; travel; and procurement of supplies, equipment, and support services.

2. (U) Project 2401, Structures: This project creates more supportable and survivable aircraft structures, investigates new structural concepts and design techniques which exploit new materials and fabrication processes to strengthen air vehicle structures while

Program Element: #0602201F
PE Title: Aerospace Flight Dynamics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

reducing weight and cost, and develops "smart" structures that will have embedded sensors to report stress, fatigue, and/or battle damage, leading to improved maintainability.

(U) FY 1993 Accomplishments:
- (U) Continued to develop advanced metallic and composite structural concepts and design techniques for air vehicles, including "smart" airframe structures. ($3,642K)
- (U) Continued to develop life enhancement methods for ensuring the structural integrity of both metallic and composite repairs. ($2,364K)

(U) FY 1994 Planned Program:
- (U) Develop advanced metallic and composite structural concepts and design techniques for air vehicles, including "smart" airframe structures. ($3,508K)
- (U) Develop life enhancement methods for ensuring the structural integrity of both metallic and composite repairs. ($2,191K)

(U) FY 1995 Planned Program:
- (U) Develop advanced metallic and composite structural concepts and design techniques for air vehicles, including "smart" airframe structures. ($3,840K)
- (U) Develop life enhancement methods for ensuring the structural integrity of both metallic and composite repairs. ($2,779K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are: Northrop, Hawthorne, CA; McDonnell Douglas, St. Louis, MO; General Dynamics (Lockheed), Ft. Worth, TX; Boeing, Wichita, KS; and Lockheed, Los Angeles, CA.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602269F, Hypersonic Technology Development.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0602201F
PE Title: Aerospace Flight Dynamics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

3. (U) Project 2402, Vehicle Equipment: This project develops technologies to reduce subsystem and component life cycle costs, improve vehicle/crew member survival in operational environments, and improve subsystem performance for current and future flight vehicles.

(U) FY 1993 Accomplishments:
- (U) Demonstrated technologies that increase performance, supportability, and affordability of air vehicle subsystems. ($5,603K)
- (U) Developed and demonstrated technologies that increase air vehicle/crewmember survivability and safety. ($2,243K)

(U) FY 1994 Planned Program:
- (U) Demonstrate technologies that increase performance, supportability, and affordability of air vehicle subsystems. ($3,024K)
- (U) Develop and demonstrate technologies that increase air vehicle/crewmember survivability and safety. ($1,040K)

(U) FY 1995 Planned Program:
- (U) Demonstrate technologies that increase performance, supportability, and affordability of air vehicle subsystems. ($3,681K)
- (U) Develop and demonstrate technologies that increase air vehicle/crewmember survivability and safety. ($1,039K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are: General Dynamics (Lockheed), Ft. Worth, TX; Garrett Corp., Torrence, CA; Canadian Commercial Corp., Ottawa, CN; McDonnell Douglas, St. Louis, MO; and Computer Technology Associates, Denver, CO.

(U) Related Activities:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0603106F, Logistics System Technology.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) PE 0604212F, Aircraft Equipment Development.
- (U) PE 0604609F, Reliability and Maintainability Technology Insertion Program.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0602201F
PE Title: Aerospace Flight Dynamics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

4. (U) Project 2403, Flight Control: This project develops technology to: enable the pilot to get the most performance from the aircraft under all conditions; provide the pilot with the display of information from on-board subsystems and off-board intelligence sources for increased situational awareness leading to enhanced mission performance and flight safety; provide robust capability to control aircraft after damage and failures; and network synthetic environments for simulation evaluation of advanced concepts.

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate advanced flight control concepts to provide a combat advantage for 21st century aircraft by increasing performance and survivability while decreasing cost and supportability requirements. ($6,163K)
- (U) Continued to develop and demonstrate technologies for improved situational awareness and supportability of current and future aircraft cockpits. ($1,692K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate advanced flight control concepts to provide a combat advantage for 21st century aircraft by increasing performance and survivability while decreasing cost and supportability requirements. ($5,124K)
- (U) Develop and demonstrate technologies for improved situational awareness and supportability of current and future aircraft cockpits. ($1,944K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate advanced flight control concepts to provide a combat advantage for 21st century aircraft by increasing performance and survivability while decreasing cost and supportability requirements. ($5,952K)
- (U) Develop and demonstrate technologies for improved situational awareness and supportability of current and future aircraft cockpits. ($2,258K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are: McDonnell Douglas, St. Louis, MO; Northrop, Hawthorne, CA; Honeywell, Minneapolis, MN; Calspan, Buffalo, NY; and System Technology Corp., Dayton, OH.

(U) Related Activities:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0602201F
PE Title: Aerospace Flight Dynamics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

5. (U) Project 2404, Aeromechanics: This project develops aerodynamic design and airframe-propulsion integration technologies for current and future flight vehicles, focusing on speed regimes ranging from low to high Mach. These technologies have potential to reduce cost; improve range to yield enhanced global force projection; and improve maneuverability while reducing observability.

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate affordable technologies to increase aerodynamic performance and survivability through reduced drag, improved fuel fraction, enhanced maneuverability and control, and reduced signature. ($4,445K)
- (U) Continued to develop and demonstrate technologies for a more efficient design cycle in the acquisition process through an integrated systems approach. ($2,011K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate affordable technologies to increase aerodynamic performance and survivability through reduced drag, improved fuel fraction, enhanced maneuverability and control, and reduced signature. ($3,740K)
- (U) Develop and demonstrate technologies for a more efficient design cycle in the acquisition process through an integrated systems approach. ($1,517K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate affordable technologies to increase aerodynamic performance and survivability through reduced drag, improved fuel fraction, enhanced maneuverability/control, and reduced signature. ($3,927K)
- (U) Develop and demonstrate technologies for a more efficient design cycle in the acquisition process through an integrated systems approach. ($2,679K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are: McDonnell Douglas, St. Louis, MO; Boeing, Seattle, WA; Northrop, Los Angeles, CA; General Dynamics (Lockheed), Ft. Worth, TX; and Grumman Aerospace Corp., Bethpage, NY.

(U) Related Activities:
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0602269F, Hypersonic Technology Development.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

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PE Title: Human Systems Technology
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A. (U) RESOURCES ($ in Thousands):

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06MD Armstrong Laboratory Operations	34,776	27,621	28,299	28,443	26,805	27,343	27,715	Cont	TBD
2729 Nuclear, Biological, and Chemical (NBC) Defense	1,648	0	0	0	0	0	0	Cont	TBD
6302 Occupational and Environmental Toxic Hazards in Air Force Operations	4,401	2,928	3,315	3,275	3,955	4,043	4,078	Cont	TBD
6770 Human Technology Studies in Advanced Systems	623	900	0	0	0	0	0	Cont	TBD
6893 Manned Weapon Systems Effectiveness	674	852	874	681	0	0	0	Cont	TBD
7184 Human System Interface Technologies	5,337	5,944	7,279	7,503	8,763	9,051	8,314	Cont	TBD
7231 Safety and Aircrew Effectiveness in Mechanical Force Environments	3,101	2,617	3,451	3,443	4,326	4,303	4,051	Cont	TBD
7755 Aircrew Selection and Standards	1,917	1,014	1,379	1,192	1,291	1,414	1,299	Cont	TBD
7757 Radiation Hazards in Aerospace Operations	4,395	4,399	5,079	4,423	5,168	5,253	4,917	Cont	TBD
7930 Advanced Crew Technology	1,897	2,027	2,842	2,836	3,242	3,340	3,323	Cont	TBD
Total	58,769	48,302	52,518	51,796	53,550	54,747	53,697	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development program develops technology for the human interface with Air Force weapon systems to improve operator efficiency and weapon systems effectiveness. This technology is divided into four key areas: (1) improve operator performance by refining crew selection, crew protection, and man-machine integration; (2) improve operator safety by protecting personnel from radiation, chemical, and mechanical forces; (3) capitalize on human factors knowledge to invent countermeasures effective against enemy

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weapon systems operators; and (4) develop defense measures to deny unauthorized access to sensitive areas on the airbase. This technology will improve combat effectiveness by expanding the parameters which define the operationally safe performance limits.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 06MD, Armstrong Laboratory Operations: This project complements all other projects in this program element by providing for the management, support, and operation of the Aerospace Medicine, Crew Systems, and Occupational and Environmental Health Directorates of the Armstrong Laboratory. It provides for: the pay and related costs of civilian scientists, engineers, and support personnel; travel; transportation of equipment; rents; communications; utilities; laboratory supplies; unique equipment; and other related costs needed to conduct human systems exploratory development technology.

2. (U) Project 2729, Nuclear, Biological, and Chemical (NBC) Defense: The goals of this project are to develop technology and procedures to address Air Force-unique needs in the areas of: operations analyses for NBC defense; detection, identification, and warning; contamination control; and individual/collective protection. This project will emphasize analysis studies of NBC defense. The project will also develop technologies with the Army in the areas of chemical and biological warfare agent detection and decontamination.

   (U) FY 1993 Accomplishments:
   - (U) Predicted necessary detection and protection performance for Chemical Biological Warfare (CBW) defense equipment for Air Force operations. ($980K)
   - (U) Improved the solid state detection and alarm technology provided to Desert Storm and explored technology for identification of biological warfare agents. ($468K)
   - (U) Developed techniques to assess the extent of decontamination required for inside cargo aircraft. ($200K)

   (U) FY 1994 Planned Program: Not Applicable.

   (U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This is program managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: Jaycor, San Diego, CA; Systems Research Laboratory, Dayton, OH; KRUG International, Dayton, OH; Rothe Development Inc., San Antonio, TX; and Illinois Institute of Technology, Chicago, IL.

(U) Related Activities:
- (U) PE 0602205F, Personnel, Training, and Simulation.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.

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- (U) PE 0604703F, Aeromedical/Casualty Care Systems Development.
- (U) PE 0604706F, Life Support Systems.
- (U) PE 0604601F, Chemical/Biological Warfare Defense Equipment.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 6302, Occupational and Environmental Toxic Hazards in Air Force Operations: This project has responsibility for toxicological technology development and assessment of Air Force materials and processes. It assesses human tolerance levels for chemicals, fuels, and materials to establish exposure criteria for designing new systems and performs trade off analysis between weapon systems performance and occupational health and environmental support requirements.

(U) FY 1993 Accomplishments:
- (U) Completed Halon 1211 replacement and strained ring compound toxicity assessments; continued solid rocket fuels toxicity studies. ($1,673K)
- (U) Studied human toxicity of chemical mixtures commonly contaminating Air Force sites and studied chemical exposure biomarkers. ($1,745K)
- (U) Studied methods of screening for metabolic activation of Air Force chemicals in cell culture and continued species extrapolation for P450 enzyme system. ($983K)

(U) FY 1994 Planned Program:
- (U) Complete Halon 1301 replacement toxicity assessment and continue support of trade off decision making of systems managers on solvents and high energy fuels. ($1,265K)
- (U) Support human health risk analysis for chemicals in soil and groundwater in support of site cleanup activities. ($1,315K)
- (U) Develop altenatives to animals for toxicological measurements on materials and models for extrapolating risks from short-term, high exposures to long-term, low exposures. ($348K)

(U) FY 1995 Planned Program:
- (U) Provide systems managers with critical information for risk versus benefit decisions for new materials such as Halon replacements, alternative solvents, and combustion toxicity for turbine engines. ($1,675K)
- (U) Assess and relate human health risks to environmental clean-up standards for groundwater chemicals such as trichloroethylene. ($1,378K)

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- (U) Develop technology to assess environmental and occupational safety of alternative compounds for use in Air Force weapons and systems. ($262K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Wright-Patterson AFB, OH. The major contractors are: Mantech Environmental Technology Toxic Hazards Research Unit, Wright-Patterson AFB, OH; and Operational Technologies Corp., San Antonio, TX.

(U) Related Activities:
- (U) PE 0602720A, Environmental Quality Technology.
- (U) PE 0602777A, Systems Health Hazard Prevention Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 6770, Human Technology Studies in Advanced Systems: This project provides scientific and technical support to in-house scientists from national scientific and technical organizations, committees, and tri-Service groups. This effort supports: (1) advisory groups for tri-Service coordination and review of programs and semi-annual reporting to higher headquarters on tri-Service research, development, and applications of human factors; (2) the National Academy of Sciences; and (3) coordinating agencies, and national and international resources, for compiling and disseminating information on the use of laboratory resources.

(U) FY 1993 Accomplishments:
- (U) Supported laboratory's scholars program in areas such as high power microwave bioeffects, high-G-induced loss of conciousness, and biophsical/mathematical models of functional version. ($513K)
- (U) Supported Air Force portion of tri-Service program for the National Academy of Science - National Research Council in the areas of training, bioacoustics, biomechanics, vision, and the Institute of Laboratory Animal Research. ($110K)

(U) FY 1994 Planned Program:
- (U) Support laboratory's scholars program in areas such as high power microwave bioeffects, high-G-induced loss of conciousness, and biophsical/mathematical models of functional version. ($700K)
- (U) Support Air Force portion of tri-Service program for the National Academy of Science - National Research Council in the areas of training, bioacoustics, biomechanics, vision, and the Institute of Laboratory Animal Research. ($200K)

(U) FY 1995 Planned Program: Not Applicable

Program Element: #0602202F
PE Title: Human Systems Technology
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Work Performed By: This program is managed by Armstrong Laboratory, Brooks AFB, TX. This program is in-house only.

(U) Related Activities: This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 6893, Manned Weapon Systems Effectiveness: This project develops technology related to human vision and motion perception in manned weapon systems. The goal is to determine weaknesses and strengths in these two critical human characteristics to assess effectiveness for: safety of flight; visual countermeasures; and air-to-ground, air-to-air, and space-based operations.

(U) FY 1993 Accomplishments:
- (U) Developed camouflage, concealment, deception, and obscuration technology to disrupt target acquisition and intelligence gathering. ($168K)
- (U) Conducted technology development to explore human information processing and system control for improved simulator and flight effectiveness. ($316K)
- (U) Developed and demonstrated technology for assessing and enhancing crew visual performance in micro-G and high-speed environments. ($190K)

(U) FY 1994 Planned Program:
- (U) Develop technology for camouflage, concealment, deception, and obscuration techiques to disrupt target acquisition and intelligence gathering. ($94K)
- (U) Explore human information processing and biocybernetic system control technologies for aircrew systems. ($550K)
- (U) Develop technology for assessing and enhancing crew visual performance in micro-G and high-speed environments. ($208K)

(U) FY 1995 Planned Program:
- (U) Develop technology for camouflage, concealment, deception, and obscuration techiques to disrupt target acquisition and intelligence gathering. ($114K)
- (U) Explore human information processing and biocybernetic system control technologies for aircrew systems. ($548K)
- (U) Develop technology for assessing and enhancing crew visual performance in micro-G and high-speed environments. ($212K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: Logicon, Torrance, CA; Science Applications International Corp., San Diego, CA; and Charles River Analytics Inc., Cambridge, MA.

Program Element: #0602202F
PE Title: Human Systems Technology
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(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0602205F, Personnel, Training, and Simulation.
- (U) PE 0602702F, Command, Control, and Communications.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603227F, Advanced Simulator Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603245F, Advanced Fighter Technology Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

6. (U) Project 7184, Human System Interface Technologies: This project develops procedures and technologies to optimize interfaces between Air Force personnel and the weapon systems they operate. Information about the characteristics of human operators is gathered and analyzed to provide design data for system control and display development. The goal is to develop, validate, and transition data, methods, and technology to improve the human interface with Air Force systems.

(U) FY 1993 Accomplishments:
- (U) Developed improved methods for measuring aircrew performance, mental workload, and situational awareness. ($550K)
- (U) Advanced system design technologies to support more effective integration of the human operator in weapon systems design. ($2,963K)
- (U) Developed component technologies and evaluation methods for helmet-mounted sensory devices and visual display systems. ($1,824K)

(U) FY 1994 Planned Program:
- (U) Develop technology for human performance and workload assessment to permit enhanced matching of pilot capabilities and cockpit tasks required during combat. ($772K)
- (U) Develop system design integration technologies using human engineering principles applied to cockpit design, training, and mission support to improve the ability of engineers to properly consider human factors early in the design process. ($3,357K)
- (U) Explore and improve human-machine interfaces for enhancing aircrew performance, using exploratory technology for better equipment fit and more effective control of subsystems from the cockpit. ($1,815K)

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PE Title: Human Systems Technology
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(U) FY 1995 Planned Program:
- (U) Develop unobtrusive, reliable predictors of human-system effectiveness. ($714K)
- (U) Develop system design technologies for greater integration of human performance data and crew system interfaces. ($4,852K)
- (U) Explore and develop helmet-mounted sensory devices and symbology for improvement of human-machine interfaces. ($1,713K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: Logicon, Torrance, CA; University of Dayton, Dayton, OH; Science Applications International Corp., San Diego, CA; and Sytronics Inc., Dayton, OH.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0602205F, Personnel, Training, and Simulation.
- (U) PE 0602702F, Command, Control, and Communications.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603227F, Advanced Simulator Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603245F, Advanced Fighter Technology Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

7. (U) Project 7231, Safety and Aircrew Effectiveness in Mechanical Force Environments: This project determines human response to mechanical forces including noise, impact, vibration, and hostile fire. This information is used for safe, effective escape/ejection systems, acceleration protection equipment, aircrew restraint devices, and for reducing crew station vulnerability. This project also develops technology based on understanding of the human auditory system for such activities as operator-centered communications, jamming, and noise exposure criteria. The project also develops technology for telepresence techniques for remote operation of mechanical systems by Air Force personnel.

(U) FY 1993 Accomplishments:
- (U) Developed and demonstrated bioacoustic technology for enhanced auditory performance and crew communications in operational environments. ($550K)
- (U) Developed technology for advanced escape and impact protection, biofidelic manikins, modeling human responses to biodynamic environments, and assessing aircrew vulnerability. ($1,350K)

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PE Title: Human Systems Technology
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- (U) Developed airbase noise prediction technology and finalized improved models for aircraft takeoff roll and helicopter noise. ($500K)
- (U) Developed technology to quantify and enhance aircrew performance in sustained acceleration environments. ($701K)

(U) FY 1994 Planned Program:
- (U) Develop bioacoustic technology and demonstrate three-dimensional audio localization integrated with helmet-mounted display. ($500K)
- (U) Develop escape and impact protection, biofidelic manikins, and human response models. ($1,167K)
- (U) Develop airbase noise prediction technology. ($350K)
- (U) Develop technology to assess aircrew performance in sustained acceleration environments. ($600K)

(U) FY 1995 Planned Program:
- (U) Develop bioacoustic technology for enhanced auditory performance and voice communications in high noise environments. ($829K)
- (U) Develop specifications of human performance in sustained acceleration environments. ($913K)
- (U) Develop advanced escape and impact protection technology for aircrew protection. ($689K)
- (U) Develop models of human response in biodynamic environments and design biofidelic manikins. ($538K)
- (U) Develop advanced airbase noise modeling technology. ($482K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: SRL Inc., Dayton, OH; Dyncorp, Albuquerque, NM; and Simula Inc., Phoenix, AZ.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603245F, Advanced Fighter Technology Integration.
- (U) PE 0604601F, Chemical/Biological Warfare Defense Equipment.
- (U) PE 0604703F, Aeromedical/Casualty Care Systems Development.
- (U) PE 0604706F, Life Support Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0602202F
PE Title: Human Systems Technology
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

8. (U) Project 7755, Aircrew Selection and Standards: The human operator is the enabling factor in all aerospace systems. The goal of this project is to optimize aircrew effectiveness through development of the understanding of: (1) medical conditions affecting aircrew selection and retention; (2) methods of early disease detection; (3) impact of disease on aircrew performance; and (4) therapeutic drug effects on flight safety.

(U) FY 1993 Accomplishments:
- (U) Updated neuropsychiatric test standards, which are critical aspects of aircrew examination for aviation safety, mission accomplishment, and readiness; recent results include the impacts of fainting, head injury, and marital discord. ($352K)
- (U) Conducted echocardiography studies on aircrew to investigate functions of the normal and mildly abnormal cardiovascular system under gravitational stress, in order to derive waiver criteria for pilots of high performance aircraft. ($862K)
- (U) Finalized study on hypertension in aircrew members to develop more sensitive and specific tests and screening methods across the spectrum of operationally significant diseases in the Air Force to enhance our ability to select, train, and retain pilots. ($703K)

(U) FY 1994 Planned Program:
- (U) Refine echocardiography studies to improve capabilities of models for predicting significance to aircrew of various cardiovascular conditions. ($546K)
- (U) Develop improved standards for vision protection devices against such hazards as ultra-violet light, laser radiation, and glare. ($468K)

(U) FY 1995 Planned Program:
- (U) Develop technology for echocardiography studies to improve capabilities of models for predicting significance to aircrew of various cardiovascular conditions. ($968K)
- (U) Begin development of prevention and health intervention strategies model to assess the best methods of reducing health risks to aircrew while maximizing their time in flying status. ($411K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: Computer Data Systems Inc., San Antonio, TX; SCEEE Services Inc., St. Cloud, FL; SRL Inc., Dayton, OH; and RDI, San Antonio, TX.

(U) Related Activities:
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0604601F, Chemical/Biological Warfare Defense Equipment.
- (U) PE 0604703F, Aeromedical/Casualty Care Systems Development.
- (U) PE 0604706F, Life Support Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

Program Element: #0602202F
PE Title: Human Systems Technology
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) International Cooperative Agreements: Not Applicable.

9. (U) Project 7757, Radiation Hazards in Aerospace Operations: This project conducts technology development on the effects and applications of electromagnetic and particulate radiation in aerospace operations. Includes: safety; environmental impact; mission success and countermeasures in combat; and biologic effects of exposure to radio frequency/microwave radiation, lasers, and ionizing radiation. Provides consultation support to other DOD programs by using unique Air Force resources to extend radiation applications, behavioral research, and operations analysis.

(U) FY 1993 Accomplishments:
- (U) Continued critical end-experiment study of bioeffects of ionizing radiation to assess the risk of cataracts, brain tumors, and lifetime cancer. ($34K)
- (U) Demonstrated proof of concept for a model assessing health effects of hand held laser weapons and began work on bioeffects of ultrashort pulse lasers for safety standard setting. ($1,053K)
- (U) Provided illumination specifications to make head-down displays compatible with laser protective eyewear. ($318K)
- (U) Improved microwave dose measurement, and dose estimation and extrapolation models for internal organs in support of bioeffects and health effects research for standard setting. ($985K)
- (U) Developed technology to assess bioeffects of radio frequency radiation (RFR). ($2,005K)

(U) FY 1994 Planned Program:
- (U) Assess cancer risk from exposure to naturally occurring radiation during high altitude flight. ($35K)
- (U) Develop technology to assess bioeffects of laser radiation. ($1,372K)
- (U) Develop technology to assess bioeffects of RFR. ($2,992K)

(U) FY 1995 Planned Program:
- (U) Develop technology to assess bioeffects of laser radiation. ($2,160K)
- (U) Develop technology to assess bioeffects of RFR. ($2,919K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: The Analytic Sciences Corp., San Antonio, TX; Systems Research Laboratories, San Antonio, TX; University of Texas, San Antonio, TX; John B. Pierce Foundation, New Haven, CT; and Georgia Institute of Technology, Atlanta, GA.

(U) Related Activities:
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0604706F, Life Support Systems.

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PE Title: Human Systems Technology
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Old Budget Activity: #1. Technology Base

Date: February 1994

- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

10. (U) Project 7930, Advanced Crew Technology: This project studies human response to physiological stressors such as rapid onset sustained acceleration, spatial disorientation, altitude, workload, and sustained operations. Design criteria and brass-board protective systems and procedures are developed to improve crew performance in this challenging environment. Additional tasks involve the evaluation, cockpit integration, and man-rating of life support equipment.

(U) FY 1993 Accomplishments:
- (U) Developed recommendations and techniques to reduce effects of fatigue during sustained operations and enhance resynchronization of circadian rhythms after rapid deployment across multiple time zones. ($400K)
- (U) Developed technology for advanced life support equipment, acceleration, and high altitude protection and spatial disorientation countermeasures. ($1,397K)
- (U) Developed component technologies for advanced molecular sieve-based oxygen generation systems and evaluated equipment for aeromedical evacuation. ($100K)

(U) FY 1994 Planned Program:
- (U) Develop technology for evaluation of aircrew sustained operational performance. ($200K)
- (U) Develop technology in spatial disorientation countermeasures, and awareness training methods and optimized cockpit display symbology. ($350K)
- (U) Develop technology to assess high-G effects. ($600K)
- (U) Develop technology for advanced life support equipment. ($577K)
- (U) Develop technology to enhance oxygen generation systems. ($300K)

(U) FY 1995 Planned Program:
- (U) Develop technology for evaluation of aircrew sustained operational performance. ($400K)
- (U) Develop spatial disorientation awareness training methods. ($388K)
- (U) Develop technology to optimize cockpit display symbology and spatial disorientation countermeasures. ($230K)
- (U) Develop technology to assess high-G effects. ($200K)
- (U) Develop technology to enhance oxygen generation systems. ($100K)

Program Element: #0602202F
PE Title: Human Systems Technology
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

- (U) Develop technology to improve advanced life support equipment and enhance survivability of aircrew in the aerospace environment. ($1,524K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: KRUG International, Dayton, OH; Systems Research Laboratory, Dayton, OH; Rothe Development Co., San Antonio, TX; Arbor Research Corp., Ann Arbor, MI; and Southwest Research Institute, San Antonio, TX.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603245F, Advanced Fighter Technology Integration.
- (U) PE 0604601F, Chemical/Biological Warfare Defense Equipment.
- (U) PE 0604706F, Life Support Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602203F
PE Title: Aerospace Propulsion
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06PP Directorate Operations	26,205	21,949	22,789	23,065	23,487	23,824	24,107	Cont	TBD
3012 Ramjet Technology	5,313	6,382	6,698	5,339	5,846	6,204	6,155	Cont	TBD
3048 Fuels and Lubrication	9,205	13,276	9,505	8,012	8,542	8,628	8,492	Cont	TBD
3066 Turbine Engine Technology	21,423	24,553	27,693	24,782	25,316	25,825	25,526	Cont	TBD
3145 Aerospace Power Technology	6,514	8,925	10,821	10,872	10,941	10,171	9,908	Cont	TBD
Total	68,660	75,085	77,506	72,070	74,132	74,652	74,188	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development program develops airbreathing propulsion and aerospace power technology. The prime areas of focus are turbine engines, ramjets, fuels and lubricants, and aerospace power technologies. Technology advances in turbine engine propulsion and lubrication systems are part of the Integrated High Performance Turbine Engine (IHPTET) initiative and will increase engine performance, reduce specific fuel consumption, and lower cost of ownership. Ramjet and combined cycle propulsion technologies will reduce the time to target for missiles to increase lethality and provide high Mach propulsion for rapid response. Fuels efforts will reduce system cost, maintenance, and the usage of hazardous cleaning materials while increasing aircraft performance and life through development of thermally stable and high heat sink fuels. Power system technologies are focused to eliminate troublesome, centralized hydraulic systems by replacement with highly reliable electric systems. Power conditioning, thermal management, and battery improvements will significantly enhance reliability, and reduce weight and life cycle costs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 06PP, Directorate Operations: Provides management and support for the Aero Propulsion and Power Directorate, Wright-Patterson AFB, OH. Includes pay and benefits for civilian personnel, travel, transportation, rentals, communications, utilities, and procurement of supplies and equipment.

Program Element: #0602203F
PE Title: Aerospace Propulsion
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

2. (U) Project 3012, Ramjet Technology: Establishes technology base for advanced propulsion concepts including: integral rocket ramjets for missile propulsion providing increased average velocity and lethality; and combined cycle engines and hydrocarbon fueled dual-mode combustion ramjets for high-speed vehicles to support future missions such as rapid strike.

(U) FY 1993 Accomplishments:
- (U) Developed ramjet components (inlets, ramburners, gas generators, port covers, throttle valves, boost motors, etc.) for airbreathing missile applications. This effort facilitates technology transition to current and future missiles with longer range, higher velocities, and increased maneuverability, increasing overall missile effectiveness. ($2,713K)
- (U) Developed components (combustors, inlets, and nozzles) for supersonic combustion ramjets for unmanned applications. This effort enables technology transition for future missile systems where time-to-target is critical. ($700K)
- (U) Developed components for combined cycle (turboramjet, air turborocket, air-core enhanced turborocket) engines for high-speed manned and unmanned systems. This effort supports technology transition for next generation reconnaisance/strike vehicles and airbreathing boosters. ($1,900K)

(U) FY 1994 Planned Program:
- (U) Develop ramjet components (inlets, ramburners, gas generators, port covers, throttle valves, boost motors, etc.) for airbreathing missile applications. This effort facilitates technology transition to current and future missiles with longer range, higher velocities, and increased maneuverability, increasing overall missile effectiveness. ($2,882K)
- (U) Develop components (combustors, inlets, and nozzles) for supersonic combustion ramjets for unmanned applications. This effort enables technology transition for future missile systems where time-to-target is critical. ($1,500K)
- (U) Develop components for combined cycle (turboramjet, air turborocket, air-core enhanced turborocket) engines for high-speed manned and unmanned systems. This effort supports technology transition for next generation reconnaisance/strike vehicles and airbreathing boosters. ($2,000K)

(U) FY 1995 Planned Program:
- (U) Develop ramjet components (inlets, ramburners, gas generators, port covers, throttle valves, boost motors, etc.) for airbreathing missile applications. This effort facilitates technology transition to current and future missiles with longer range, higher velocities, and increased maneuverability, increasing overall missile effectiveness. ($2,598K)
- (U) Develop components (combustors and nozzles) for supersonic combustion ramjets for unmanned applications. This effort enables technology transition for future missile systems where time-to-target is critical. ($1,500K)
- (U) Develop components for combined cycle (turboramjet, air turborocket, air-core enhanced turborocket) engines for high-speed manned and unmanned systems. This effort supports technology transition for next generation reconnaisance/strike vehicles and airbreathing boosters. ($2,600K)

Program Element: #0602203F
PE Title: Aerospace Propulsion
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: Atlantic Research Corp., Gainesville, VA; General Electric, Evendale, OH; Pratt and Whitney, West Palm Beach, FL; Hughes Aircraft, Canoga Park, CA; and Hercules, McGregor, TX.

(U) Related Activities:
- (U) PE 0603216F, Aerospace Propulsion and Power Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3048, Fuels and Lubrication: Develops advanced fuels, lubricants, and component technologies for use in aircraft and missile engines. Conventional petroleum and alternate fuels are developed and evaluated for Air Force applications. Fuels and lubricants must be thermally stable, cost-effective, and operate at higher temperatures.

(U) FY 1993 Accomplishments:
- (U) Developed preliminary JP8+100 fuel specification and endothermic hydrocarbon fuels derived from petroleum and/or coal to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is necessary for current and future aircraft to reduce fuel systems fouling and provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($5,105K)
- (U) Developed combustor design methodology and technology base to develop advanced turbine engine combustors. This will reduce the risk and cost associated with developing high performance, low maintenance engines that operate efficiently within air pollution guidelines and have high thrust-to-weight ratio and low specific fuel consumption. ($1,200K)
- (U) Developed high temperature liquid and alternate lubricants to upgrade performance and reliability, decrease operational and maintenance costs of current engines, and meet the high operating temperatures of future high performance engines. ($1,200K)
- (U) Developed mainshaft bearings, seals, dampers, and gearbox components for gas turbine engines. This will permit engines with higher operating temperatures, longer life, and reduced weight. ($1,700K)

(U) FY 1994 Planned Program:
- (U) Develop high thermal stability and endothermic hydrocarbon fuels to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is for current and future aircraft to reduce fuel systems fouling and provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($6,494K)

Program Element: #0602203F
PE Title: Aerospace Propulsion
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Develop high performance, low emmission combustor concepts for advanced turbine engines. This will reduce the risk and cost associated with developing high performance, low maintenance engines that operate efficiently within air pollution guidelines and have high thrust-to-weight ratio and low specific fuel consumption. ($1,233K)
- (U) Develop high temperature liquid and alternate lubricants to upgrade performance and reliability, decrease operational and maintenance costs of current engines, and meet the high operating temperatures of future high performance engines. ($1,644K)
- (U) Develop mainshaft bearings, seals, dampers, and gearbox components for gas turbine engines. This will permit engines with higher operating temperatures, longer life, and reduced weight. ($3,905K)

(U) FY 1995 Planned Program:
- (U) Develop high thermal stability and endothermic hydrocarbon fuels to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is for current and future aircraft to reduce fuel systems fouling and provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($2,381K)
- (U) Develop high performance, low emmission combustor concepts for advanced turbine engines. This will reduce the risk and cost associated with developing high performance, low maintenance engines that operate efficiently within air pollution guidelines and have high thrust-to-weight ratio and low specific fuel consumption. ($1,106K)
- (U) Develop high temperature liquid and alternate lubricants to upgrade performance and reliability, decrease operational and maintenance costs of current engines, and meet the high operating temperatures of future high performance engines. ($1,861K)
- (U) Develop mainshaft bearings, seals, dampers, and gearbox components for gas turbine engines. This will permit engines with higher operating temperatures, longer life, and reduced weight. ($4,157K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors for this project are: General Electric, Evendale, OH; United Technologies, East Hartford, CT, and West Palm Beach, FL; University of Dayton Research Institute, Dayton, OH; and Allied Signal, Energy and Materials Research Center, Chicago, IL.

(U) Related Activities:
- (U) PE 0603216F, Aerospace Propulsion and Power Technology.
- (U) This project has been coordinated through the Project Réliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 3066, Turbine Engine Technology: Develops technology to increase propulsion system operational reliability, mission flexibility, and performance while reducing weight, fuel consumption, and cost of ownership. Analytical and experimental efforts are conducted in

Program Element: #0602203F
PE Title: Aerospace Propulsion
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

fans/compressors, high temperature combustors, turbines, internal flow systems, controls, exhaust systems, and structural design. This project supports the Integrated High Performance Turbine Engine Technology (IHPTET) initiative.

(U) FY 1993 Accomplishments:
- (U) Developed core engine components (compressors, combustors, and turbines) for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. These components will provide aircraft engines with higher performance, increased durability, reduced fuel consumption, and lower life cycle cost. ($14,568K)
- (U) Developed turbine engine components (fans, low pressure turbines, engine controls, exhaust nozzles, and integration technology) for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. These components will provide aircraft engines with higher performance, increased durability, reduced fuel consumption, and lower life cycle cost. ($5,356K)
- (U) Developed components for expendable engines for missile and unmanned air vehicle applications. These compenents will provide expendable engines with reduced cost, reduced fuel consumption, and increased specific thrust, greatly expanding the operating envelops of cruise missiles. ($1,071K)
- (U) Developed components for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, and theater transports. ($428K)

(U) FY 1994 Planned Program:
- (U) Develop core engine components (compressors, combustors, and turbines) for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. These components will provide aircraft engines with higher performance, increased durability, reduced fuel consumption, and lower life cycle cost. ($16,906K)
- (U) Develop turbine engine components (fans, low pressure turbines, engine controls, exhaust nozzles, and integration technology) for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. These components will provide aircraft engines with higher performance, increased durability, reduced fuel consumption, and lower life cycle cost. ($4,701K)
- (U) Develop components for expendable engines for missile and unmanned air vehicle applications. These compenents will provide expendable engines with reduced cost, reduced fuel consumption, and increased specific thrust, greatly expanding the operating envelops of cruise missiles. ($1,841K)
- (U) Develop components for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, and theater transports. ($1,105K)

(U) FY 1995 Planned Program:
- (U) Develop core engine components (compressors, combustors, and turbines) for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. These components will provide aircraft engines with higher performance, increased durability, reduced fuel consumption, and lower life cycle cost. ($20,233K)

Program Element: #0602203F
PE Title: Aerospace Propulsion
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

- (U) Develop turbine engine components (fans, low pressure turbines, engine controls, exhaust nozzles, and integration technology) for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. These components will provide aircraft engines with higher performance, increased durability, reduced fuel consumption, and lower life cycle cost. ($3,443K)
- (U) Develop components for expendable engines for missile and unmanned air vehicle applications. These compenents will provide expendable engines with reduced cost, reduced fuel consumption, and increased specific thrust, greatly expanding the operating envelops of cruise missiles. ($2,582K)
- (U) Develop components for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, and theater transports. ($1,435K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: General Electric, Evendale, OH; Pratt and Whitney, West Palm Beach, FL, and East Hartford, CT; Allison Engine Company, Indianapolis, IN; Textron Lycoming, Stratford, CT; and Williams International, Walled Lake, MI.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0603202F, Aircraft Propulsion Subsystem Integration.
- (U) PE 0603216F, Aerospace Propulsion and Power Technology.
- (U) PE 0602122N, Aircraft Technology.
- (U) PE 0603210N, Aircraft Propulsion.
- (U) PE 0603003A, Aviation Advanced Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 3145, Aerospace Power Technology: Develops technologies for aerospace power generation, conversion, and transmission systems including advanced electrical power component and subsystem technologies. Power components are developed for aircraft and flight line equipment to increase reliability, maintainability, commonality, and supportability. This project supports an iniative which uses electrical power to replace hydraulic and pneumatic power and their costly logistics support. Essentially, all power electronics technology being developed has dual-use opportunities. Specific application areas include electric automobiles, electric brakes, electrically actuated power steering, and a wide range of variable speed industrial motor drive applications.

Program Element: #0602203F
PE Title: Aerospace Propuls. n
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Developed aerospace batteries and power generation, conversion, and transmission components for aircraft systems. These components provide aircraft with a high degree of self-sufficiency, improved reliability, maintainability, and supportability, all yielding a quicker aircraft turn-around time. In addition, ground support equipment requirements will be dramatically reduced. ($5,667K)
- (U) Developed components for generation, conversion, and transmission of high levels of electrical power. This will provide reliable, high quality electrical power for future high power surveillance and communications systems. ($617K)
- (U) Developed battery systems for guidance, navigation, and control functions for missile systems. Batteries with higher power density, longer life, increased reliability, and rechargability will provide missiles systems with greater reliability and reduced maintenance costs. ($130K)
- (U) Developed special purpose power components for advanced surveillance and communications systems, as well as ground power applications. ($100K)

(U) FY 1994 Planned Program:
- (U) Develop aerospace batteries and power generation, conversion, and transmission components for aircraft systems. These components provide aircraft with a high degree of self-sufficiency, improved reliability, maintainability, and supportability, all yielding a quicker aircraft turn-around time. In addition, ground support equipment requirements will be dramatically reduced. ($7,675K)
- (U) Develop components for generation, conversion, and transmission of high levels of electrical power. This will provide reliable, high quality electrical power for future high power surveillance and communications systems. ($625K)
- (U) Develop battery systems for guidance, navigation, and control functions for missile systems. Batteries with higher power density, longer life, increased reliability, and rechargability will provide missiles systems with greater reliability and reduced maintenance costs. ($525K)
- (U) Develop special purpose power components for advanced surveillance and communications systems, as well as ground power applications. ($100K)

(U) FY 1995 Planned Program:
- (U) Develop aerospace batteries and power generation, conversion, and transmission components for aircraft systems. These components provide aircraft with a high degree of self-sufficiency, improved reliability, maintainability, and supportability, all yielding a quicker aircraft turn-around time. In addition, ground support equipment requirements will be dramatically reduced. ($10,180K)
- (U) Develop components for generation, conversion, and transmission of high levels of electrical power. This will provide reliable, high quality electrical power for future high power surveillance and communications systems. ($108K)
- (U) Develop battery systems for guidance, navigation, and control functions for missile systems. Batteries with higher power density, longer life, increased reliability, and rechargability will provide missiles systems with greater reliability and reduced maintenance costs. ($433K)

Program Element: #0602203F
PE Title: Aerospace Propulsion
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Develop special purpose power components for advanced surveillance and communications systems, as well as ground power applications. ($100K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: General Electric, Schenectady, NY; Allied Signal, Phoenix, AZ; Northrop Corporation, Hawthorne, CA; Leach, Los Angeles, CA; and Johnson Controls, Milwaukee, WI.

(U) Related Activities:
- (U) PE 0603216F, Aerospace Propulsion and Power Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06AA Laboratory Operations	42,197	37,232	41,990	43,101	43,836	44,587	45,388	Cont	TBD
2000 Active Electronic Countermeasures	2,978	2,991	3,387	3,356	3,541	3,545	3,513	Cont	TBD
2001 Electro-Optical Technology	2,266	2,276	2,577	2,553	2,694	2,697	2,673	Cont	TBD
2002 Microwave Technology	4,556	4,575	5,181	5,134	5,417	5,423	5,374	Cont	TBD
2003 Avionics System Design Technology	3,460	3,475	3,935	3,899	4,114	4,118	4,081	Cont	TBD
2004 Reconnaissance/Strike Electro-Optical Sensors	1,445	1,451	1,643	1,628	1,718	1,720	1,704	Cont	TBD
6095 Inertial Reference and Guidance Technology	1,542	1,548	1,754	1,738	1,833	1,835	1,819	Cont	TBD
6096 Microelectronics Technology	3,462	3,477	3,937	3,901	4,116	4,121	4,083	Cont	TBD
7622 Reconnaissance/Strike Radio Frequency Sensors	2,477	2,487	2,817	2,791	2,945	2,948	2,922	Cont	TBD
7629 Fire Control Avionics	2,957	2,969	3,363	3,332	3,516	3,520	3,488	Cont	TBD
7633 Passive Electronic Countermeasures	2,730	2,741	3,105	3,076	3,246	3,250	3,220	Cont	TBD
7662 Avionics Data Transmission and Reception	865	869	984	976	1,028	1,030	1,020	Cont	TBD
Total	70,935	66,091	74,673	75,485	78,004	78,794	79,285	Cont	TBD

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development program establishes technology feasibility and develops the technology base for Air Force avionics needs to include target detection and classification, fire control, navigation, communication, jamming and deception of hostile defenses, architectures, signal/data processing, and electronic devices. Advances in avionics are needed to multiply weapons effectiveness, enhance reliability, and reduce life cycle costs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 06AA, Laboratory Operations: Provides for management and support of Wright Laboratory's Avionics and Electronics Technology Directorates, Wright-Patterson AFB, OH. It includes civilian pay, travel, utility costs, and building maintenance.

2. (U) Project 2000, Active Electronic Countermeasures: Determines technical feasibility to jam, deceive, or disable electronic threats throughout the electromagnetic spectrum. Advanced electronic countermeasures are required to degrade or deny enemy air defense threat capability.

(U) FY 1993 Accomplishments:
- (U) Developed technology for a laser-based jamming capability to counter infrared (IR)-guided missiles which use imaging seekers. ($1,128K)
- (U) Developed off-board radio frequency (RF) countermeasure technology and concepts to support affordable solutions to electronic warfare (EW) threats. ($950K)
- (U) Developed on-board RF countermeasure technology and concepts to support affordable solutions to EW threats. ($900K)

(U) FY 1994 Planned Program:
- (U) Develop technology for a laser-based jamming capability to counter IR-guided missiles which use imaging seekers. ($1,141K)
- (U) Develop off-board RF countermeasure technology and concepts to support affordable solutions to EW threats. ($950K)
- (U) Develop on-board RF countermeasure technology and concepts to support affordable solutions to EW threats. ($900K)

(U) FY 1995 Planned Program:
- (U) Develop technology for a laser-based jamming capability to counter IR-guided missiles which use imaging seekers. ($1,287K)
- (U) Develop off-board RF countermeasure technology and concepts to support affordable solutions to EW threats. ($1,150K)
- (U) Develop on-board RF countermeasure technology and concepts to support affordable solutions to EW threats. ($950K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Hughes Aircraft Co., El Segundo, CA; Harris Corp., Melbourne, FL; Lockheed-Sanders, Nashua, NH; ITT Corp., Nutley, NJ; and SRL Inc., Dayton, OH.

(U) Related Activities:
- (U) PE 0603270F, Electronic Combat Technology.
- (U) Joint Director of Laboratories, Technology Panel on Electronic Warfare, coordinates this program with the other Services.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2001, Electro-Optical Technology: Determines technical feasibility of low and medium power laser sources, optical pre-processing devices, and countermeasure, radar, imaging, warning, and weapon delivery systems detector/focal plane arrays. Improved electro-optical systems are required to increase engagement ranges and detect increasingly complex targets.

(U) FY 1993 Accomplishments:
- (U) Developed laser source technology of less than one kilowatt power for advanced targeting and reference capabilities. ($750K)
- (U) Developed electro-optical detector technology for advanced reconnaissance and strike sensors. ($500K)
- (U) Developed optical processing technology for automatic target recognizers, imaging, and other high throughput, real-time processing including optical multi-chip module interconnects. ($800K)
- (U) Developed ultra-violet (UV) technology for UV detectors and arrays. ($216K)

(U) FY 1994 Planned Program:
- (U) Develop laser source technology of less than one kilowatt power for advanced targeting and reference capabilities. ($600K)
- (U) Develop electro-optical detector technology for advanced reconnaissance and strike sensors. ($500K)
- (U) Develop optical processing technology for automatic target recognizers, imaging, and other high throughput, real-time processing including optical multi-chip module interconnects. ($700K)
- (U) Develop UV gallium nitride (UV-GaN) technology for laser diodes, detectors, and arrays. ($476K)

(U) FY 1995 Planned Program:
- (U) Develop laser source technology of less than one kilowatt power for advanced targeting and reference capabilities. ($650K)
- (U) Develop electro-optical detector technology for advanced reconnaissance and strike sensors. ($600K)
- (U) Develop optical processing technology for target recognizers, imaging, and other high throughput, real-time processing including optical multi-chip module interconnects. ($800K)
- (U) Develop UV-GaN technology for laser diodes, detectors, and arrays. ($527K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: AT&T, Holmdel, NJ; Westinghouse, Pittsburgh, PA; Lockheed-Sanders, Nashua, NH; Honeywell, Minneapolis, MN; and Hughes, El Segundo and Malibu, CA.

(U) Related Activities:
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0602702F, Command, Control, and Communications.
- (U) PE 0603270F, Electronic Combat Technology.
- (U) Coordinated with DOD Advisory Group on Electron Devices.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 2002, Microwave Technology: Determines technical feasibility of microwave (MW) and millimeter wave (MMW) devices, integrated circuits (IC), and components to include solid state and thermionic devices, MW/MMW integrated circuits (MMICs), power and low noise amplifiers, controllers, broadband transmit/receive (T/R) modules, and advanced active apertures.

(U) FY 1993 Accomplishments:
- (U) Developed advanced solid state device and IC technology to enable new and upgraded aircraft electronic systems. ($2,506K)
- (U) Developed MMW components to provide enhanced weapon transceiver capability. ($600K)
- (U) Developed solid state phased array radar, electronic warfare (EW), and communications technology, to include T/R modules. ($650K)
- (U) Developed advanced vacuum electronic devices for new and upgraded airborne radar and EW systems. ($250K)
- (U) Developed MW/digital mixed mode components for an advanced airborne multifunction phased array capability. ($550K)

(U) FY 1994 Planned Program:
- (U) Develop advanced solid state device and IC technology to enable new and upgraded aircraft electronic systems. ($2,475K)
- (U) Develop MMW components to provide enhanced weapon transceiver capability. ($600K)
- (U) Develop solid state phased array radar, EW, and communications technology which include T/R modules. ($650K)
- (U) Develop advanced vacuum electronic devices for new and upgraded airborne radar and EW systems. ($300K)
- (U) Develop MW/digital mixed mode components for an advanced airborne multifunction phased array capability. ($550K)

(U) FY 1995 Planned Program:
- (U) Develop advanced solid state device and IC technology to enable new and upgraded aircraft electronic systems. ($2,850K)
- (U) Develop MMW components to provide enhanced weapon transceiver capability. ($600K)
- (U) Develop solid state phased array radar, EW , and communications technology which include T/R modules. ($681K)
- (U) Develop advanced vacuum electronic devices for new and upgraded airborne radar and EW systems. ($450K)
- (U) Develop MW/digital mixed mode components for an advanced airborne multifunction phased array capability. ($600K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Hughes Aircraft, El Segundo, CA; TI, Dallas, TX; Raytheon, Lexington, MA; Rockwell International, Thousand Oaks, CA; and TRW, Redondo Beach, CA.

(U) Related Activities:
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0603270F, Electronic Combat Technology.
- (U) PE 0603739E, Microwave/Millimeterwave Integrated Circuits.
- (U) Coordinated with DOD Advisory Group on Electron Devices.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 2003, Avionics System Design Technology: Determines technical feasibility of technology for avionics displays, signal/data processing hardware, sensor integration, real-time distributed software, and artificial intelligence to improve weapon systems performance, avionics availability, and crew situational awareness.

(U) FY 1993 Accomplishments:
- (U) Developed advanced processor and software technology to provide for increased functionality and flexibility of embedded, real-time airborne data processing. ($3,050K)
- (U) Developed advanced integration, fusion, and data management technology that enables increased exploitation of avionics assets to provide for more cost-effective system solutions. ($200K)
- (U) Developed advanced machine intelligence technology to provide a capability for improved communications, recognition and understanding of sensor data, and pilot-aiding aircraft system controls. ($210K)

(U) FY 1994 Planned Program:
- (U) Develop advanced processor and software technology to provide for increased functionality and flexibility of embedded, real-time airborne data processing. ($3,065K)
- (U) Develop advanced integration, fusion, and data management technology that enables increased exploitation of avionics assets to provide for more cost-effective system solutions. ($200K)
- (U) Develop advanced machine intelligence technology to provide a capability for improved communications, recognition and understanding of sensor data, and pilot-aiding aircraft system controls. ($210K)

(U) FY 1995 Planned Program:
- (U) Develop advanced processor and software technology to provide for increased functionality and flexibility of embedded, real-time airborne data processing. ($3,462K)
- (U) Develop advanced integration, fusion, and data management technology that enables increased exploitation of avionics assets to provide for more cost-effective system solutions. ($213K)
- (U) Develop advanced machine intelligence technology to provide a capability for improved communications, recognition and understanding of sensor data, and pilot-aiding aircraft system controls. ($260K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Honeywell, Minneapolis, MN; Dimension Technology, Rochester, NY; Harris, Melbourne, FL; Westinghouse, Baltimore, MD; and Lockheed-Sanders, Nashua, NH.

(U) Related Activities:
- (U) PE 0603253F, Advanced Avionics Integration
- (U) PE 0602301E, Intelligence System Program.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

6. (U) Project 2004, Reconnaissance/Strike Electro-Optical Sensors: Determines technical feasibility of technology to improve performance, supportability, and cost of passive and active electro-optical (EO) sensors for reconnaissance, acquisition, and strike to improve target discrimination, increase kill probability, decrease pilot workload, increase survivability, and improve low probability of detection.

(U) FY 1993 Accomplishments:
- (U) Developed advanced EO sensor technology for air-to-ground reconnaissance and targeting in adverse-weather and improved countermeasure immunity. ($560K)
- (U) Developed advanced air-to-surface EO, including multifrequency, sensor technology that are more uniform in response to target radiation and better adapted to interface with real-time processors for automated target recognition and enhanced situational displays. ($395K)
- (U) Developed advanced laser radar technology for adverse-weather navigation, terrain following, and obstacle avoidance. ($490K)

(U) FY 1994 Planned Program:
- (U) Develop advanced EO sensor technology for air-to-ground reconnaissance and targeting in adverse-weather and improved countermeasure immunity. ($560K)
- (U) Develop advanced air-to-surface EO, including multifrequency, sensor technology that are more uniform in response to target radiation and better adapted to interface with real-time processors for automated target recognition and enhanced situational displays. ($395K)
- (U) Develop advanced laser radar technology for adverse-weather navigation, terrain following, and obstacle avoidance. ($496K)

(U) FY 1995 Planned Program:
- (U) Develop advanced EO sensor technology for air-to-ground reconnaissance and targeting in adverse-weather and improved countermeasure immunity. ($653K)
- (U) Develop advanced air-to-surface EO, including multifrequency, sensor technology that are more uniform in response to target radiation and better adapted to interface with real-time processors for automated target recognition and enhanced situational displays. ($445K)
- (U) Develop advanced laser radar technology for adverse-weather navigation, terrain following, and obstacle avoidance. ($545K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Technology Scientific Services Inc., Dayton, OH; Environmental Research Institute of Michigan, Ann Arbor, MI; Lockheed, Palo Alto, CA; Amber Engineering, Goleta, CA; and Electro-Optic Infrared Measurements, Spotsylvania, VA.

(U) Related Activities:
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0603707F, Weather Systems Advanced Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

7. (U) Project 6095, Inertial Reference and Guidance Technology: Determines technical feasibility of technology for navigation and guidance sensors and systems and for communication, navigation, identification, and electronic warfare (EW) multifunction antennas. Accuracy improvements in aerospace inertial navigation systems and sensors are needed to conduct reconnaissance and precision attack missions.

(U) FY 1993 Accomplishments:
- (U) Developed advanced solid state miniature inertial sensor technology suitable for airborne applications to reduce size, weight, power, and cost and to increase system reliability. ($920K)
- (U) Developed technology to provide for reduced jamming vulnerability and increased precision targeting and strike accuracy of Global Positioning System (GPS) and to exploit the benefits of GPS to improve offensive and defensive combat capabilities at reduced cost. ($500K)
- (U) Developed technology for low-observable, wideband, multifunction antennas for communication, navigation, and identification (CNI) functions to provide for a reduction in the number of antennas required and an increase in weapon systems survivability. ($122K)

(U) FY 1994 Planned Program:
- (U) Develop advanced solid state miniature inertial sensor technology suitable for airborne applications to reduce size, weight, power, and cost and to increase system reliability. ($968K)
- (U) Develop technology to provide for reduced jamming vulnerability and increased precision targeting and strike accuracy of GPS and to exploit the benefits of GPS to improve offensive and defensive combat capabilities at reduced cost. ($130K)
- (U) Develop technology for low-observable, wideband, multifunction antennas for CNI functions to provide for a reduction in the number of antennas required and an increase in weapon systems survivability. ($450K)

(U) FY 1995 Planned Program:
- (U) Develop advanced solid state miniature inertial sensor technology suitable for airborne applications to reduce size, weight, power, and cost and to increase system reliability. ($980K)
- (U) Develop technology to provide for reduced jamming vulnerability and increased precision targeting and strike accuracy of GPS and to exploit the benefits of GPS to improve offensive and defensive combat capabilities at reduced cost ($284K)
- (U) Develop technology for low-observable, wideband, multifunction antennas for CNI functions to provide for a reduction in the number of antennas required and an increase in weapon systems survivability. ($490K)

(U) Work Performed By. This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are. Litton, Hartford, CT; TRW, San Diego, CA; McDonnell Douglas, St Louis, MO; TASC, Reading, MA; and Sundstrand Data Control, Redmond, WA.

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Related Activities:
- (U) PE 0603253F, Advanced Avionics Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

8. (U) Project 6096, Microelectronics Technology: Determines technical feasibility of technology to maintain a comprehensive integrated circuit (IC) technology base for current and future weapon and support applications. This includes device feasibility and development, device application, design, and associated packaging and power management technology to preserve and utilize device performance in electronic equipment.

(U) FY 1993 Accomplishments:
- (U) Developed gallium arsenide-, indium phosphide-, and silicon carbide-based high-speed and low power integrated circuits including analog to digital converter circuits for military electronics. ($1,846K)
- (U) Developed advanced packaging and power management technology for improved cost and reliability of military electronics and developed microsensors for aircraft pressure sensing and missile accelerometers. ($803K)
- (U) Developed advanced design tools and integrated them into a common software environment to design application specific integrated circuits and multi-chip modules for performance, affordability, and reliability improvements in military signal processors. ($813K)

(U) FY 1994 Planned Program:
- (U) Develop, or adapt from commercially available products, gallium arsenide-, indium phosphide-, and silicon carbide-based high-speed and low power integrated circuits including analog to digital converter circuits for military electronics. ($1,646K)
- (U) Develop advanced packaging and power management technology for improved cost and reliability of military electronics and develop microsensors for aircraft pressure sensing and missile accelerometers. ($970K)
- (U) Develop advanced design tools and integrate them into a common software environment to design application specific integrated circuits and multi-chip modules for performance, affordability, and reliability improvements in military signal processors. ($861K)

(U) FY 1995 Planned Program:
- (U) Develop, or adapt from commercially available products, gallium arsenide-, indium phosphide-, and silicon carbide-based high-speed and low power integrated circuits including analog to digital converter circuits for military electronics. ($1,737K)
- (U) Develop advanced packaging and power management technology for improved cost and reliability of military electronics and develop microsensors for aircraft pressure sensing and missile accelerometers. ($1,600K)
- (U) Develop advanced design tools and integrate them into a common software environment to design application specific integrated circuits and multi-chip modules for performance, affordability, and reliability improvements in military signal processors. ($800K)

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Rockwell International, Thousand Oaks, CA; TI, Dallas, TX; Honeywell, Minneapolis, MN; TRW, Redondo Beach, CA; and General Electric, Schnectady, NY.

(U) Related Activities:
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0602702F, Command, Control, and Communications.
- (U) Coordinated with DOD Advisory Group on Electron Devices.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

9. (U) Project 7622, Reconnaissance/Strike Radio Frequency Sensors: Determines technical feasibility of technology for reconnaissance and strike radio frequency sensors, with emphasis on reliable, all-weather acquisition of surface and airborne targets with difficult signatures due to reduced cross sections, concealment and camouflage measures, severe clutter, and heavy jamming.

(U) FY 1993 Accomplishments:
- (U) Developed advanced air-to-air radar sensor and target detection technology, including multi-dimensional, adaptive algorithms, for improved target detection, clutter rejection, and electronic countermeasure mitigation. ($804K)
- (U) Developed air-to-ground synthetic aperture radar (SAR) sensor and discrimination technology for foliage penetration and targeting and advanced motion compensation techniques for ultra-high resolution SAR for use in precision mapping and targeting and recognition. ($948K)
- (U) Developed low-cost radar architecture and technology and exploited emerging advances in microwave and signal processing devices to provide more flexible and affordable capability. ($586K)
- (U) Developed conceptual solutions for terrain scattered jamming. ($139K)

(U) FY 1994 Planned Program:
- (U) Develop advanced air-to-air radar sensor and target detection technology, including multi-dimensional, adaptive algorithms, for improved target detection, clutter rejection, and electronic countermeasure mitigation. ($950K)
- (U) Develop air-to-ground SAR sensor and discrimination technology for foliage penetration and targeting and advanced motion compensation techniques for ultra-high resolution SAR for use in precision mapping and targeting and recognition. ($945K)
- (U) Develop low-cost radar architecture and technology and exploit emerging advances in microwave and signal processing devices to provide more flexible and affordable capability. ($592K)

(U) FY 1995 Planned Program:
- (U) Develop advanced air-to-air radar sensor and target detection technology, including multi-dimensional, adaptive algorithms, for improved target detection, clutter rejection, and electronic countermeasure mitigation. ($1,100K)

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Develop air-to-ground synthetic aperture radar (SAR) sensor and discrimination technology for foliage penetration and targeting and advanced motion compensation techniques for ultra-high resolution SAR for use in precision mapping and targeting and recognition. ($1,125K)
- (U) Develop low-cost radar architecture and technology and exploit emerging advances in microwave and signal processing devices to provide more flexible and affordable capability. ($592K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: ERIM, Ann Arbor, MI; Westinghouse, Linthicum, MD; Norden, Norwalk, CT; JPL, Pasadena, CA; and TSC, Santa Monica, CA.

(U) Related Activities:
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0603253F, Advanced Avionics Integration.
- (U) Coordinated through Joint Directors of Laboratories Sensor and Electronic Warfare Panels.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

10. (U) Project 7629, Fire Control Avionics: Determines technical feasibility of technology and concepts for fire control that aid in precisely locating, identifying, and targeting airborne and surface targets, with emphasis on reduced signature targets and opportunity targets, to enable new covert tactics for successful accomplishment of air-to-air and air-to-surface strike scenarios.

(U) FY 1993 Accomplishments:
- (U) Developed air-to-air fire control, tracking, and sensor management technology for a first shot, first kill capability. This will result in increased kill ratios, increased survivability, and reduced pilot workload. ($750K)
- (U) Developed air-to-surface fire control, tracking, and sensor management technology for single pass precision accuracy weapon deployment, increased survivability, force multiplication, and reduced pilot workload. Both on-board and off-board targeting were evaluated. ($299K)
- (U) Developed advanced model-based vision target recognition technology for longer-range, all-aspect, real-time, high-confidence air-to-air and air-to-surface hostile target identification. ($1,908K)

(U) FY 1994 Planned Program:
- (U) Develop air-to-air fire control, tracking, and sensor management technology for a first shot, first kill capability. This will result in increased kill ratios, increased survivability, and reduced pilot workload. ($750K)
- (U) Develop air-to-surface fire control, tracking, and sensor management technology for single pass precision accuracy weapon deployment, increased survivability, force multiplication, and reduced pilot workload. Both on-board and off-board targeting will be evaluated. ($299K)

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Develop advanced model-based vision target recognition technology for longer-range, all-aspect, real-time, high-confidence air-to-air and air-to-surface hostile target identification. ($1,920K)

(U) FY 1995 Planned Program:
- (U) Develop air-to-air fire control, tracking, and sensor management technology for a first shot, first kill capability. This will result in increased kill ratios, increased survivability, and reduced pilot workload. ($843K)
- (U) Develop air-to-surface fire control, tracking, and sensor management technology for single pass precision accuracy weapon deployment, increased survivability, force multiplication, and reduced pilot workload. Both on-board and off-board targeting will be evaluated. ($300K)
- (U) Develop advanced model-based vision target recognition technology for longer-range, all-aspect, real-time, high-confidence air-to-air and air-to-surface hostile target identification. ($2,220K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: New York University, New York, NY; Honeywell, Minneapolis, MN; McDonnell Douglas, St. Louis, MO; Westinghouse, Baltimore, MD; and Veda, Dayton, OH.

(U) Related Activities:
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) Tri-Service Joint Services Guidance and Control Committee.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

11. (U) Project 7633, Passive Electronic Countermeasures: Determines technical feasibility of technology for passive electronic countermeasure (ECM) technology and techniques to provide for improved threat warning, reduced detectability, improved expendables, and to exploit foreign systems to reveal countermeasures vulnerabilities. This technology must be continually evolved to counter changing threats to ensure aircraft survivability.

(U) FY 1993 Accomplishments:
- (U) Developed technology for generic hardware and software modules to enable low-cost block upgrades to existing operational electronic warfare (EW) receivers. ($750K)
- (U) Developed all-digital EW receiver and associated antenna for improved reliability and flexibility in response to ever changing EW threat environment. ($700K)
- (U) Developed an enhanced warning capability with advanced detector and processing technology and integrated missile warning, laser warning, and targeting sensors to provide for an improved pilot protection capability. ($1,280K)

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop technology for generic hardware and software modules to enable low-cost block upgrades to existing operational electronic warfare (EW) receivers. ($750K)
- (U) Develop all-digital EW receiver and associated antenna for improved reliability and flexibility in response to ever changing EW threat environment. ($710K)
- (U) Develop an enhanced warning capability with advanced detector and processing technology and integrated missile warning, laser warning, and targeting sensors to provide for an improved pilot protection capability. ($1,281K)

(U) FY 1995 Planned Program:
- (U) Develop technology for generic hardware and software modules to enable low-cost block upgrades to existing operational EW receivers. ($850K)
- (U) Develop all-digital EW receiver and associated antenna for improved reliability and flexibility in response to ever changing EW threat environment. ($800K)
- (U) Develop an enhanced warning capability with advanced detector and processing technology and integrated missile warning, laser warning, and targeting sensors to provide for an improved pilot protection capability. ($1,455K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Systems Research Laboratory, Dayton, OH; Loral, Yonkers, NY; Eaton AIL, Deer Park, NY; Honeywell, Minneapolis, MN; and Tracor Aerospace, Austin, TX.

(U) Related Activities:
- (U) PE 0603270F, Electronic Combat Technology.
- (U) Joint Director of Laboratories, Technology Program for Electronic Warfare, Tri-Service Coordinating Body.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

12. (U) Project 7662, Avionics Data Transmission and Reception: Determines technical feasibility of technology to provide for the growing need to transmit data between aircraft with high integrity, low probability of detection (LPD), and high jam resistance (JR). LPD communications are required to reduce aircraft physical and electromagnetic vulnerability and eliminate requirement for 'no communications' operations providing major improvements in strike effectiveness.

(U) FY 1993 Accomplishments:
- (U) Developed technology to provide for a capability of improved communication system electromagnetic interference rejection which in turn will provide the pilot more reliable communications in the combat environment. ($50K)
- (U) Developed adaptive technology to provide for a capability of medium capacity LPD/JR airborne air-to-air exchange of time-critical threat, sensor, and cooperative operations information. ($215K)

Program Element: #0602204F
PE Title: Aerospace Avionics
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Developed technology to provide for short-range voice and low-data-rate low probability of detection (LPD)/jam resistance (JR) information transfer capability to eliminate the need for "comm out" operations and increase survivability. ($600K)

(U) FY 1994 Planned Program:
- (U) Develop technology to provide for a capability of improved communication system electromagnetic interference rejection which in turn will provide the pilot more reliable communications in the combat environment. ($100K)
- (U) Develop adaptive technology to provide for a capability of medium capacity LPD/JR airborne air-to-air exchange of time-critical threat, sensor, and cooperative operations information. ($50K)
- (U) Develop technology to provide for short-range voice and low-data-rate LPD/JR information transfer capability to eliminate the need for "comm out" operations and increase survivability. ($575K)
- (U) Develop technology to provide for automation of cockpit communications to reduce pilot workload and increase the availability of communications during combat operations. ($144K)

(U) FY 1995 Planned Program:
- (U) Develop technology to provide for a capability of improved communication system electromagnetic interference rejection which in turn will provide the pilot more reliable communications in the combat environment. ($314K)
- (U) Develop adaptive technology to provide for a capability of medium capacity LPD/JR airborne air-to-air exchange of time-critical threat, sensor, and cooperative operations information. ($75K)
- (U) Develop technology to provide for short-range voice and low-data-rate LPD/JR information transfer capability to eliminate the need for "comm out" operations and increase survivability. ($320K)
- (U) Develop technology to provide for automation of cockpit communications to reduce pilot workload and increase the availability of communications during combat operations. ($275K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Georgia Technical Research Institute, Atlanta, GA; TRW, Dayton, OH; TI, Dallas, TX; Martin Marietta, Denver, CO; and University of Dayton Research Institute, Dayton, OH.

(U) Related Activities:
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0603253F, Advanced Avionics Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Date February 1994

Program Element: #0602205F
PE Title: Personnel, Training, and Simulation
Budget Activity #2, Exploratory Development
Old Budget Activity: #1, Technology Base

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06HT Armstrong Laboratory Support	12,729	10,964	10,948	10,774	10,744	11,146	11,431	Cont	TBD
1121 Training Development and Assessment Technology	3,441	3,271	4,020	3,454	3,407	3,589	3,240	Cont	TBD
1123 Aircrew Training Technology	7,809	6,915	7,751	7,544	6,810	6,845	6,398	Cont	TBD
1710 Logistics and Maintenance Technology	4,119	3,708	4,125	4,067	3,690	3,663	3,423	Cont	TBD
7719 Force Acquisition and Distribution Technology	3,067	2,567	3,004	2,787	2,638	2,629	2,363	Cont	TBD
Total	31,165	27,425	29,848	28,626	27,289	27,872	26,855	Cont	TBD

B (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development program develops technologies to increase operational readiness by providing more effective methods to classify, assign, train, and retain personnel, minimizing the manpower and equipment necessary to conduct maintenance; increasing weapon systems supportability, and improving wartime logistics planning. This program focuses on reducing the manpower required to operate and support weapon systems and on improving the effectiveness of the operators and maintainers

C (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995

1 (U) Project 06HT, Armstrong Laboratory Support This project provides for the management, support, and operations of the Human Resources Directorate of the Armstrong Laboratory The Directorate is located at Brooks AFB, TX; Wright-Patterson AFB, OH, and Mesa, AZ It provides for: pay and related costs of civilian personnel, equipment transportation; rents, communications and utilities costs; reproduction; and supplies, equipment, and contractor support services. Funds support and complement all projects in this PE

2. (U) Project 1121, Training Development and Assessment Technology This project develops technology to accelerate learning and increase skill/knowledge retention, job performance, and cost-effective methods for designing, delivering, and evaluating training Increased use of

Program Element #0602205F
PE Title: Personnel, Training, and Simulation
Budget Activity: #2, Exploratory Development
Old Budget Activity #1, Technology Base

Date. February 1994

advanced technology and changes in the overall qualifications of the recruit pool add challenge to the already demanding task of training Air Force recruits.

(U) FY 1993 Accomplishments.
- (U) Developed technologies for instructional design to assist training developers in creating improved educational programs ($1,236K)
- (U) Applied advanced human-machine interface technologies to intelligent tutoring technologies to enhance learning performance ($1,300K)
- (U) Developed training evaluation models to quantify skill decay and transfer of skills from one expertise to another for retrained personnel ($905K)

(U) FY 1994 Planned Program
- (U) Develop preliminary specifications for evaluation of various tutoring technologies. ($341K)
- (U) Evaluate the impact of the use of integrated maintenance information on training requirements to determine the best instructional procedures ($1,100K)
- (U) Develop and evaluate tutors to be used for training of fundamental skills needed by Air Force recruits ($750K)
- (U) Develop technology for automated instructional design support tools to assist trainers in developing educational programs ($1,080K)

(U) FY 1995 Planned Program:
- (U) Develop technologies for intelligent/adaptive training tutors such as cognitive engineering and advanced man-machine interfaces to enhance performance of Air Force educational programs ($2,487K)
- (U) Design, develop, and evaluate interactive instructional technologies, including interactive distance learning technologies, to improve the efficiency of training and expand the experience base of the participating students ($1,213K)
- (U) Develop and evaluate preflight trainer technology for use in the ready room using existing data bases ($320K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Brooks AFB, TX The major contractors are: FMC Corp, Santa Clara, CA, MEI Technology, Lexington, MA, Harris Corp, Melbourne, FL, Universal Energy Systems, Dayton, OH, and McDonnell Douglas Corp., St. Louis, MO

(U) Related Activities.
- (U) PE 0602233N, Mission Support Technology - Personnel, Training, and Simulation Technology Area
- (U) PE 0602785A, Manpower, Personnel, and Training Technology.
- (U) PE 0603227F, Personnel, Training, and Simulation Technology
- (U) PE 0604243F, Manpower, Personnel, and Training Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

Program Element #0602205F
PE Title Personnel, Training, and Simulation
Budget Activity #2, Exploratory Development
Old Budget Activity #1, Technology Base

Date February 1994

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements Not Applicable

3 (U) Project 1123, Aircrew Training Technology This project develops and evaluates new methods and techniques for aircrew training. It investigates the spectrum of aircrew training for the best ways to design, deliver, and assess training on the ground and in the air. It develops and evaluates flight training technologies from desk-top trainers to full-mission simulators to determine how to achieve maximum fidelity at minimum cost This project will reduce the cost of future aircrew training systems and increase the capability for realistic combat training

(U) FY 1993 Accomplishments:
- (U) Developed head-mounted debrief technology for air intercept part-task training to improve aircrew training effectiveness ($1,300K)
- (U) Developed training technoloy for use of forward-looking infrared/radar night vision goggles by aircrew ($1,209K)
- (U) Developed situational awareness metrics for analysis of multi-ship tactics to improve assessment of aircrew performance during simulated combat ($2,000K)
- (U) Assessed low-cost visual display as potential replacement to displays used for aerial combat training ($1,800K)
- (U) Determined scene content and image generator refresh rates needed to properly train for high-speed, low-level flight using visual display trainers to better define technology needs for training devices. ($1,500K)

(U) FY 1994 Planned Program.
- (U) Develop multiship mission planning/rehearsal procedures for simulators ($1,090K)
- (U) Evaluate low-cost, rear-screen-projection technology for visual displays used in combat mission training ($2,075K)
- (U) Determine needs for visual scenes used for combat mission training to better define key areas for improvement in visual displays. ($1,250K)
- (U) Continue developing technology to improve training for aircrew with night vision goggles. ($1,050K)
- (U) Develop improved technology for ground control intercept training using advanced man-machine interfaces ($800K)
- (U) Determine the ability of low-cost training environments using advanced man-machine interfaces to support and improve aircrew training. ($650K)

(U) FY 1995 Planned Program
- (U) Using metrics developed from ground-based performance studies, assess the ability to predict aircrew situational awareness to lead to improved capability to select and train aircrew ($2,666K)
- (U) Determine needs for visual scene content to support networked combat mission training to improve program focus on developing new training technology ($880K)

Program Element: #0602205F
PE Title: Personnel, Training, and Simulation
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Determine cost-effective methods of retraining aircrew skills to reduce costs for many aspects of training, such as mission rehearsal, instructor control of the learning environment, and feedback to the aircrew ($1,390K)
- (U) Determine cost-effectiveness of training technology for networked multiple aircrew simulators, and for networking of multiple simulator sites ($2,400K)
- (U) Determine ability of low-cost simulator technology to support aircrew training using advanced man-machine interfaces ($415K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Mesa, AZ. The major contractors are University of Dayton, Dayton, OH; and General Electric Corp, Daytona Beach, FL

(U) Related Activities:
- (U) PE 0602233N, Mission Support Technology Personnel, Training, and Simulation Technology Area
- (U) PE 0602727A, Non-System Training Devices Technology
- (U) PE 0603227F, Personnel, Training, and Simulation Technology
- (U) PE 0604227F, Flight Simulator Development
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds: Not Applicable

(U) International Cooperative Agreements. Not Applicable

4 (U) Project 1710, Logistics and Maintenance Technology: This project develops technologies to improve logistics support to both combat and peacetime operations; planning and assessment models for realistic computation of wartime logistics requirements and capabilities; trade off methods to reduce manpower and equipment needed to maintain aircraft in dispersed locations, and software tools to design improved reliability, maintainability, supportability, and man-machine interfaces to reduce life cycle costs

(U) FY 1993 Accomplishments
- (U) Developed a test data base which documents the human resource consequences of design decisions in F-16 and C-130 maintenance domains ($264K)
- (U) Developed human performance process models which partially replicate human behavior to enhance performance of logistics support ($301K)
- (U) Developed and demonstrated a generic analysis model to help logistics planners make more accurate planning decisions ($499K)
- (U) Performed a preliminary cost/benefit analysis for implementation of integrated maintenance information for 0-level maintenance ($75K)
- (U) Completed studies to determine best man-machine interface design for portable maintenance aids for use on the flightline ($80K)

Program Element: #0602205F
PE Title. Personnel, Training, and Simulation
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date February 1994

- (U) Continued technology development on logistics support for improved reliability, maintainability, and supportability ($2,900K)

(U) FY 1994 Planned Program
- (U) Develop a computer test-bed to determine how well humans interact with new equipment while the equipment is still in the early design phase. ($367K)
- (U) Define functional specification for an advanced definition of system requirements and decision support tool ($400K)
- (U) Perform a feasibility study to determine the potential for developing a logistics technology "blueprint" to define technology needs through the year 2020 ($100K)
- (U) Continue technology development on logistics support for improved reliability, maintainability, and supportability ($2,841K)

(U) FY 1995 Planned Program:
- (U) Develop technology to improve the reliability, maintainability, and deployability of Air Force ground support equipment, such as power carts and cargo handling devices. ($1,695K)
- (U) Develop planning analysis models to improve logistics support during deployment. ($775K)
- (U) Develop technology to diagnose and fix aircraft mission software problems to reduce aircraft downtime and increases mission readiness. ($680K)
- (U) Develop analysis of information needs to identify problem areas in logistics support for composite wings to provide better focus in technology development for future logistics support ($975K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Wright-Patterson AFB, OH The major contractors are. University of Dayton, Dayton, OH, BBN, Cambridge, MA, NCI Information Systems, McLean, VA, and Atlantic Research Corp , Fairborn, OH

(U) Related Activities:
- (U) PE 0602231N, Mission Support Technology: Human Factors Technology Area
- (U) PE 0602716A, Human Factors Engineering Technology Development.
- (U) PE 0603106F, Logistics Systems Technology
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements. Not Applicable.

Program Element #0602205F
PE Title: Personnel, Training, and Simulation
Budget Activity. #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

5 (U) Project 7719, Force Acquisition and Distribution Technology This project develops personnel qualification and aptitude measurement methods, job specification standards, and manpower and personnel models to provide methods and tools for optimal selection, classification, and assignment of personnel

(U) FY 1993 Accomplishments
- (U) Completed development of intial software technology to use neural networks in analysis of manpower requirements ($350K)
- (U) Developed estimates of workforce productivity based on occupational survey data. ($350K)
- (U) Developed, demonstrated, and evaluated test technology for selecting pilots for tactical air combat to improve selection capability for aircrew ($400K)
- (U) Completed guidelines for cognitive task analysis and cognitive abilities measurement technology to enhance force acquisition and distribution. ($1,667K)
- (U) Continued development of automated personnel testing technologies to improve Air Force personnel selection capability ($300K)

(U) FY 1994 Planned Program
- (U) Develop technologies to assess enlisted recruiting costs by aptitude and job interest, and selection and classification policy to evaluate recruiting budget allocations ($667K)
- (U) Develop and evaluate computer-assisted personality test technology for pilot selection ($400K)
- (U) Evaluate and refine cognitive abilities measurement test technology and cognitive task analysis guidelines in order to improve the capability to match personnel to specific jobs ($1,100K)
- (U) Complete technology development of an automated job survey that will permit improved assessment of personnel selection and classification policies ($400K)

(U) FY 1995 Planned Program
- (U) Develop technology for improved person-job match and personnel allocation during deployment to improve unit performance and productivity ($1,200K)
- (U) Deliver a generalizable methodology for determining individual and unit productivity ($300K)
- (U) Develop crew resource management test technology for selecting Air National Guard and United States Air Force Reserve pilots ($400K)
- (U) Develop initial perceptual-motor performance test technology for aircrew selection and classification ($400K)
- (U) Develop technology for assessing technical training success, improved job standards, and personnel requirements for weapon systems to maximize utilization of scarce personnel resources ($704K)

(U) Work Performed By This program is managed by Armstrong Laboratory, Brooks AFB, TX The major contractors are Metrica Inc , Bryan, TX; Computer Data Systems Inc , San Antonio, TX, and Systems Research and Applications Corp , San Antonio, TX

Program Element. #0602205F
PE Title Personnel, Training, and Simulation
Budget Activity. #2, Exploratory Development
Old Budget Activity. #1, Technology Base

Date: February 1994

(U) Related Activities
- (U) PE 0602233N, Mission Support Technology Personnel, Training, and Simulation Technology Area
- (U) PE 0602785A, Manpower, Personnel, and Training Technology
- (U) PE 0603227F, Personnel, Training, and Simulation Technology
- (U) PE 0604243F, Manpower, Personnel, and Training Development
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds Not Applicable

(U) International Cooperative Agreements Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602206F
PE Title: Civil Engineering and Environmental Quality
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06ED Laboratory Operations	0	2,177	2,420	2,501	2,259	2,130	2,377	Cont	TBD
1900 Environmental Quality Technology	7,168	1,833	2,236	2,991	3,597	3,837	3,965	Cont	TBD
2673 Air Base Operability Technology	4,473	2,143	2,389	3,183	3,805	4,049	4,177	Cont	TBD
Total	11,641	6,153	7,045	8,675	9,661	10,016	10,519	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Science and Technology Exploratory Development program develops civil engineering and environmental technology for deploying, operating, and maintaining Air Force weapon systems. These technologies support the following areas: protective construction of air base facilities, utilities, and operating surfaces against conventional and chemical/biological attacks; air mobile structures; rapid air base battle damage assessment and repair; cost-effective maintenance and repair of air base facilities, utilities, and operating surfaces; peacetime and post-attack air base and aircraft fire suppression and crash rescue; control, detection, and disposal of pollutants from Air Force operations; reduction of hazardous waste generation at air bases; and methods for cleaning up contaminated Air Force sites.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 06ED, Laboratory Operations: This project will support and complement all other projects in this program element and provides for management, support, and operation of the Armstrong and Wright Laboratories located at Tyndall AFB, FL. It provides for: the pay and related costs of civilian scientists, engineers, and support personnel; travel; transportation of equipment; rents; communications; utilities; laboratory supplies; unique equipment; and related costs.

2. (U) Project 1900, Environmental Quality Technology: This project characterizes the chemistry of Air Force generated pollutants and toxic materials, assesses their interaction with the environment, and develops control and clean-up technologies. Efforts are conducted to reduce the cost and increase the effectiveness of technologies that protect the environment. New Air Force fuels and chemicals, such as jet engine and rocket fuels, are analyzed to prevent environmental problems from occurring and to prevent delays in testing and fielding weapon systems. Materials are investigated and new processes explored to minimize hazardous waste generation. Novel site remediation, monitoring, and modeling technologies are also explored.

Program Element: #0602206F
PE Title: Civil Engineering and Environmental Quality
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Developed technologies to remove contaminants from industrial wastewaters. ($1,761K)
- (U) Developed technologies for the treatment and disposal of energetic materials. ($700K)
- (U) Developed air emissions controls for Air Force maintenance processes. ($1,029K)
- (U) Determined fate and transport mechanisms for subsurface contaminants. ($875K)
- (U) Developed physical and chemical treatment technologies for soil and groundwater. ($1,787K)
- (U) Developed aerobic and anaerobic bioremediation technologies for contaminated aquifers. ($1,016K)

(U) FY 1994 Planned Program:
- (U) Develop mechanisms to biodegrade explosive compounds and dispose of Air Force material waste. ($236K)
- (U) Determine the rates and products of photochemical reactions of Air Force compounds such as solvents and fire fighting agents. ($335K)
- (U) Develop and identify cost-effective methods to characterize, monitor, and remediate Air Force sites contaminated with fuels and solvents. ($687K)
- (U) Develop and identify technologies to reduce and model Air Force emissions of air pollutants including air toxics, oxides of nitrogen (NOx), and combustion sources emissions. ($575K)

(U) FY 1995 Planned Program:
- (U) Develop bioremediation processes of new fuels and solvents. ($250K)
- (U) Explore surfactants to reduce contaminant mobility in groundwater plumes. ($138K)
- (U) Determine abiotic reactions to enhance in situ remediation of contaminated soil. ($237K)
- (U) Develop environmental interaction of advanced fuels and chemicals to predict fate and transport within groundwater. ($250K)
- (U) Develop standard tests for environmental sensors to monitor contamination levels. ($50K)
- (U) Develop technologies to recycle and recover processing chemicals from industrial sludges. ($315K)
- (U) Develop technologies to destroy organic material in industrial waste treatment plant effluents and metal finishing waste streams. ($146K)
- (U) Determine site characteristics for natural attenuation of contaminated soils. ($235K)
- (U) Continue development of cost-effective technologies to control air emissions from air bases. ($500K)
- (U) Continue wind tunnel simulations of complex terrain flows of airborne toxicants from space launch operations and aborts. ($115K)

(U) Work Performed By: This program is managed by Armstrong Laboratory, Tyndall AFB, FL. The major contractors are: EG&G, Idaho Falls, ID; Martin Marietta, Oak Ridge, TN; ASI, Albuquerque, NM; General Atomics, San Diego, CA; and Lockheed Missiles and Space, Palo Alto, CA.

Program Element: #0602206F
PE Title: Civil Engineering and Environmental Quality
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Related Activities:
- (U) PE 0602102F, Defense Research Sciences.
- (U) PE 0602102F, Materials.
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602203F, Aerospace Propulsion.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0603723F, Civil and Environmental Engineering Technology.
- (U) PE 0603716D, Strategic Environmental Research and Development Program.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2673, Air Base Operability Technology: This project provides the technology base for current and future Air Force systems in these areas: survivable air base structures, utilities, and operating surfaces against more accurate and powerful conventional and chemical/biological weapons; battle damage assessment and repair; air mobile structures; and cost-effective fire protection, maintenance, and repair of air base facilities, utilities, and operating surfaces.

(U) FY 1993 Accomplishments:
- (U) Developed technologies and design criteria for improved bare-base/fixed-site applications (e.g., power and environmental utilities, survivable air base structures, and durable/repairable airfield surfaces). ($3,655K)
- (U) Developed advanced aircraft/air base fire fighting technologies (e.g., clean, environmentally-safe fire fighting agents, vehicles, equipment, personnel protective clothing, fire risk assessment techniques, and fire fighter training systems). ($818K)

(U) FY 1994 Planned Program:
- (U) Develop technologies and design criteria for improved bare-base/fixed-site applications (e.g., power and environmental utilities, survivable air base structures, and durable/repairable airfield surfaces). ($1,632K)
- (U) Develop advanced aircraft/air base fire fighting technologies (e.g., clean, environmentally-safe fire fighting agents, vehicles, equipment, personnel protective clothing, fire risk assessment techniques, and fire fighter training systems). ($511K)

(U) FY 1995 Planned Program:
- (U) Develop technologies and design criteria for improved bare-base/fixed-site applications (e.g., power and environmental utilities, survivable air base structures, and durable/repairable airfield surfaces). ($1,683K)

Program Element: #0602206F
PE Title: Civil Engineering and Environmental Quality
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Develop advanced aircraft/air base fire fighting technologies (e.g., clean, environmentally-safe fire fighting agents, vehicles, equipment, personnel protective clothing, fire risk assessment techniques, and fire fighter training systems). ($706K)

(U) Work Performed By: This program is managed by Wright Laboratory, Tyndall AFB, FL. The major contractors are: New Mexico Engineering Research Institute, Albuquerque, NM; Applied Research Associates, Albuquerque, NM; EML Research, Hudson, NH; Research Associates of Syracuse, Syracuse, NY; and Harris Group, Reston, VA.

(U) Related Activities:
- (U) PE 0601102F, Defense Research Sciences.
- (U) PE 0602102F, Materials.
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602203F, Aerospace Propulsion.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603307F, Air Base Operability Advanced Development.
- (U) PE 0603723F, Civil and Environmental Engineering Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602269F
PE Title: Hypersonic Technology Development
Budget Activity: #2, Exploratory Development
Old Budget Acitivity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
1025 Hypersonic Systems Technology	0	0	45,000	46,164	46,614	47,073	47,559	Cont	TBD
Total*	0	0	45,000	46,164	46,614	47,073	47,559	Cont	TBD

* Development of hypersonic technologies was previously conducted under the National Aero-Space Plane (NASP) program. There are no FY 1993 and FY 1994 funds associated with this program element.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development program develops advanced technology for hypersonic systems and will provide revolutionary technologies to satisfy future Air Force needs to include hypersonic weapon systems and future space launch concepts This program will transition the accomplishments made in hypersonic technologies by the NASP program into an Advanced Development program to investigate the feasibility of hypersonic systems Technologies developed under this program are dual-use, civilian and military, and applicable to both DoD and NASA requirements and future needs.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 1025, Hypersonic Systems Technology: This is the only major Air Force program that develops hypersonic vehicle technologies. The primary goal of the hypersonic technology program is to prove the technological feasibility and operability of a supersonic combustion ramjet (scramjet) engine through experiments of scramjets using excess ballistic missile assets to test at the highest Mach numbers, Mach 10-15, and to improve scramjet performance. Airbreathing hypersonic propulsion systems (i.e , scramjets), high-temperature/high-strength materials and structures, and hypersonic aerodynamics will be investigated to ensure operability and survivability of the scramjet under the demanding environmental effects of hypersonic experimentation.

   (U) FY 1993 Accomplishments: Not Applicable

   (U) FY 1994 Planned Program: Not Applicable.

Program Element: #0602269F
PE Title: Hypersonic Technology Development
Budget Activity: #2, Exploratory Development
Old Budget Acitivity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1995 Planned Program:
- (U) Develop scramjet technologies for advanced hypersonic propulsion systems. ($45,000K)

(U) Work Performed By: A joint Air Force/NASA Program Office at Wright-Patterson AFB, OH, manages the program The top five contractors are: Pratt and Whitney, West Palm Beach, FL; Rocketdyne, Canoga Park, CA; Lockheed, Fort Worth, TX; McDonnell Douglas, Saint Louis, MO; and Rockwell, Downey, CA.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) PE 0602102F, Materials.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
1010 Geophysics Technology(1)	33,785	31,676	29,900	28,750	28,800	29,600	29,800	Cont	TBD
1011 Rocket Propulsion Technology(2)	30,155	31,487	31,500	30,600	30,800	31,000	31,300	Cont	TBD
3326 Lasers and Imaging Technology(3)	22,214	30,986	18,400	17,050	17,900	18,100	18,400	Cont	TBD
5797 Advanced Weapons Technology and Assessments(4)	18,902	14,820	18,505	17,104	17,977	18,108	18,428	Cont	TBD
8809 Satellite Technology(5)	15,554	23,226	26,897	26,303	27,128	27,321	27,649	Cont	TBD
Total	120,610	132,195	125,202	119,807	122,605	124,129	125,577	Cont	TBD

Note: Beginning in FY 1995, the three Exploratory Development PEs at Phillips Laboratory (PE 0602601F, Advanced Weapons; PE 0602101F, Geophysics; and PE 0602302F, Rocket Propulsion and Astronautics Technology) have been combined into this PE. The funding for FY 1993 and FY 1994 includes funding from all three PEs distributed according to the new project alignment.

(1) This project was formed from most of PE 0602101F. The FY 1993 and FY 1994 funding includes all funds in PE 0602101F except Project 7659, Aerospace Systems Technology, part of Project 7601, Space Effects on Air Force Systems, and their associated portion of Project 06GL, Laboratory Operations.
(2) This project was formed from the two propulsion projects in PE 0602302F and the appropriate Laboratory Operation funds.
(3) Part of Project 2218, Directed Energy Weapon Technology Assessment, and the appropriate share of Project 06WL, Laboratory Operations, from PE 0602601F, were added to this project.
(4) Part of Project 2218 and part of Project 8809, Space Systems Survivability and Hardness Technology, from PE 0602601F plus part of Project 7601 from PE 0602101F and the appropriate share of Laboratory Operation funds from PE 0602101F and PE 0602601F were added to this project.
(5) Project 7659 from PE 0602101F and Project 2864, Space Vehicle Technology, from PE 0602302F plus part of Project 8809 from PE 0602601F with the appropriate share of Laboratory Operation funds from all three PEs were used to form this project.

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element is the Exploratory Development technology program for the Phillips Laboratory's (PL's) corporate mission areas of space, ballistic missiles, directed energy weapons (lasers and high power microwaves), long-range optical imaging, geophysics, and rocket propulsion (space systems and ballistic and tactical missiles).

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 1010, Geophysics Technology: This project develops the technology to understand, mitigate, and exploit the effects of the natural environment on the design and operation of Air Force systems. This includes: defining, modeling, and developing techniques to predict the solar and space environment; developing models that specify and predict optical and infrared backgrounds and signatures of spacecraft and other targets; characterizing plasmas generated by aerospace vehicles; developing techniques to predict when and where ionospheric disturbances will occur; specifying atmospheric drag effects on satellites; measuring and modeling space debris; advancing technology in earth motions and seismology for nuclear test monitoring and test band treaty verification; and developing new techniques for measuring, modeling, simulation, and predicting meteorological properties impacting the Air Force mission. The project also develops modeling and simulation programs to enhance military system design and testing capabilities.

(U) FY 1993 Accomplishments: The following efforts were accomplished in PE 0602101F:
- (U) Continued development of space radiation specification and solar hazard prediction techniques for space system design and operations. ($6,880K)
- (U) Continued development of atmospheric optical background simulations, models, and integrated codes for space system design and operation. ($6,050K)
- (U) Continued development of active and passive remote sensing techniques for target signature identification and atmospheric wind profile measurements. ($3,680K)
- (U) Continued development of global ionosphere models for communications, system applications, and neutral atmosphere models for satellite orbit forecasts. ($7,930K)
- (U) Continued measuring and modelling effects of local plasmas on Air Force space systems. ($2,810K)
- (U) Continued development of seismic event identification techniques for nuclear test ban treaty verification. ($580K)
- (U) Continued development of global and theater weather analysis, simulation, and prediction techniques for combat weather system applications. ($5,855K)

(U) FY 1994 Planned Program: The following efforts are planned in PE 0602101F:
- (U) Continue development of space radiation specification and solar hazard prediction techniques for space system design and operations. ($5,570K)
- (U) Continue development of atmospheric optical background simulations, models, and integrated codes for space system design and operation. ($4,950K)

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Continue development of active and passive remote sensing techniques for target signature identification and atmospheric wind profile measurements. ($2,970K)
- (U) Continue development of global ionosphere models for communications, system applications, and neutral atmosphere models for satellite orbit forecasts. ($8,600K)
- (U) Continue measuring and modelling effects of local plasmas on Air Force space systems. ($2,300K)
- (U) Continue development of seismic event identification techniques for nuclear test ban treaty verification. ($2,256K)
- (U) Continue development of global and theater weather analysis, simulation, and prediction techniques for combat weather system applications. ($5,030K)

(U) FY 1995 Planned Program:
- (U) Continue development of space radiation specification and solar hazard prediction techniques for space system design and operations. ($6,370K)
- (U) Continue development of atmospheric optical background simulations, models, and integrated codes for space system design and operation. ($5,550K)
- (U) Continue development of active and passive remote sensing techniques for target signature identification and atmospheric wind profile measurements. ($3,400K)
- (U) Continue development of global ionosphere models for communications, system applications, and neutral atmosphere models for satellite orbit forecasts. ($6,050K)
- (U) Continue measuring and modelling effects of local plasmas on Air Force space systems. ($2,600K)
- (U) Continue development of seismic event identification techniques for nuclear test ban treaty verification. ($530K)
- (U) Continue development of global and theater weather analysis, simulation, and prediction techniques for combat weather system applications. ($5,400K)

(U) Work Performed By: The Phillips Laboratory, Hanscom AFB, MA, manages this program. The major contractors are: Atmospheric Environmental Research, Cambridge, MA; Northwest Research Associates, Bellevue, WA; Boston College, Chestnut Hill, MA; S-Cubed, La Jolla, CA; and Sparta, Lexington, MA.

(U) Related Activities:
- (U) PE 0305160F, Defense Meteorological Satellite Program.
- (U) PE 0601102F, Defense Research Sciences.
- (U) PE 0603410F, Space Systems Environmental Interactions Technology.
- (U) PE 0603707F, Weather Systems Advanced Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 1011, Rocket Propulsion Technology: This project develops and demonstrates rocket propulsion technologies for launch vehicle, upper stage, and tactical and ballistic missile applications. This program conducts exploratory development to transition the most promising basic research technologies into component and subsystem applications to demonstrate the feasibility and potential mission payoffs. Technologies of interest are those which will improve reliability, operability, survivability, affordability, environmental compatibility, and performance of future propulsion systems.

(U) FY 1993 Accomplishments: The following efforts were accomplished in PE 0602302F:
- (U) Continued development of advanced propellants which are environmentally safe during manufacture, storage, and use. ($5,400K)
- (U) Continued development of components necessary for the incorporation of advanced environmentally friendly propellants into existing and future missile systems. ($12,582K)
- (U) Continued development of cryogenic propulsion technology to meet the needs of reliable, safe, and low-cost access to space. ($7,173K)
- (U) Continued development of high energy density materials. ($5,000K)

(U) FY 1994 Planned Program: The following efforts are planned in PE 0602302F:
- (U) Continue development of advanced propellants which are environmentally safe during manufacture, storage, and use. ($5,000K)
- (U) Continue development of components necessary for the incorporation of advanced environmentally friendly propellants into existing and future missile systems. ($13,627K)
- (U) Continue development of cryogenic propulsion technology to meet the needs of reliable, safe, and low-cost access to space. ($7,860K)
- (U) Continue development of high energy density materials. ($5,000K)

(U) FY 1995 Planned Program:
- (U) Continue development of advanced propellants which are environmentally safe during manufacture, storage, and use. ($5,000K)
- (U) Continue development of components necessary for the incorporation of advanced environmentally friendly propellants into existing and future missile systems. ($11,800K)
- (U) Continue development of cryogenic propulsion technology to meet the needs of reliable, safe, and low-cost access to space. ($9,000K)
- (U) Continue development of high energy density materials. ($5,700K)

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) Work Performed By: The Phillips Laboratory, Edwards AFB, CA, manages this project. The major contractors are: Aerojet Propulsion, Sacramento, CA; Hercules Aerospace Company, Manga, UT; General Dynamics Space Systems, San Diego, CA; Rockwell Rocketdyne, Canoga Park, CA; and United Technologies/Pratt and Whitney, West Palm Beach, FL.

(U) Related Activities:
- (U) PE 0602111N, Anti-Air/Anti-Surface Warfare Technology.
- (U) PE 0602303A, Missile Technology.
- (U) PE 0603302F, Space and Missile Rocket Propulsion Technology.
- (U) PE 0603311F, Ballistic Missile Technology.
- (U) PE 0603401F, Advanced Spacecraft Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3326, Lasers and Imaging Technology: This project examines the technical feasibility of moderate to high power lasers, associated optical components, and long-range optical imaging concepts for Air Force mission requirements. This includes: advanced short wavelength laser devices for applications such as illuminators and imaging sources; advanced optical imaging techniques for target identification and assessment as well as aimpoint selection, maintenance, and damage assessment; high power laser device and optical component technology; advanced beam control and atmospheric compensation technology, tools and techniques for laser target vulnerability assessments, and nonlinear optics processes and techniques. In FY 1995, the laser assessment studies in Project 2218 will be combined into this project.

(U) FY 1993 Accomplishments:
- (U) Continued development of various laser device technologies for various military applications. ($4,314K)
- (U) Continued development of long-range optical imaging technologies for increased resolution and data fusion to support missions such as space object identification. ($4,650K)
- (U) Continued to investigate and develop nonlinear optics technologies to support imaging and other applications. ($3,450K)
- (U) Continued the investigation and development of advanced high energy laser optical components. ($3,250K)
- (U) Contracted for the Maui supercomputer capability. ($4,550K)
- (U) The following bullet was accomplished in Project 2218:
- (U) Continued laser assessment studies to identify technologies required for high payoff military applications of laser and optical systems. ($2,000K)

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Continue development of various laser device technologies for applications such as illuminators and wavelength-specific military missions. ($3,986K)
- (U) Continue development of long-range optical imaging technologies for increased resolution and data fusion to support missions such as space object identification (SOI). ($4,300K)
- (U) Continue to investigate and develop nonlinear optics (NLO) technologies to support imaging and other applications. ($2,900K)
- (U) Continue the investigation and development of advanced high energy laser optical components. ($2,800K)
- (U) Continue development of the Maui supercomputer facility. ($15,000K)
- (U) The following bullet is planned in Project 2218:
- (U) Continue laser assessment studies to identify technologies required for high payoff military applications of laser and optical systems. ($2,000K)

(U) FY 1995 Planned Program:
- (U) Continue development of generic high energy laser device technology for applications such as illuminators and wavelength-specific military missions. ($2,180K)
- (U) Continue to develop high power laser diode device technology at alternative wavelength for high payoff military applications. ($4,415K)
- (U) Develop basic excimer laser source and target coupling technology for high payoff applications such as laser induced microwave effects. ($2,640K)
- (U) Continue development of long-range optical imaging technologies for increased resolution and data fusion to support missions such as SOI. ($3,190K)
- (U) Continue to investigate and develop NLO technologies to support imaging and other applications. ($2,120K)
- (U) Continue the investigation and development of advanced high energy laser optical components. ($2,100K)
- (U) Continue laser assessment studies to identify technologies required for high payoff military applications of laser and optical systems. ($1,755K)

(U) Work Performed By: The Phillips Laboratory, Kirtland AFB, NM, manages this program. The major contractors are: Logicon-RDA, Los Angeles, CA; S-Systems Corporation, Inglewood, CA; BDM, McLean, VA; Rockwell Power Services, Albuquerque, NM; and Applied Technologies, Albuquerque, NM.

(U) Related Activities:
- (U) PE 0602101N, Directed Energy Weapons.
- (U) PE 0602307A, Laser Weapon Technology.
- (U) PE 0603314A, High Energy Laser and Directed Energy Components.

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) PE 0603319F, Airborne Laser Demonstrator.
- (U) PE 0603605F, Advanced Weapons Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 5797, Advanced Weapons Technology and Assessments: This project explores high power microwave (HPM) and other unconventional weapon concepts using innovative technologies such as compact toroids. Technologies are developed that support a wide range of Air Force missions such as space control, command and control warfare, and counter-air warfare. This project also provides vulnerability assessments of representative U.S. strategic and tactical systems to directed energy weapons (DEWs), DEW technology assessment for specific Air Force missions, and DEW lethality assessments against foreign targets. In addition to DEW threats, this project conducts assessments of specific space environmental (natural and man-made) effects on space systems and develops hardening technologies and methodologies.

(U) FY 1993 Accomplishments:
- (U) Continued to develop generic advanced weapon technologies that support a wide range of Air Force applications. ($5,725K)
- (U) Continued to develop HPM technologies, including susceptibility and effects experiments, and modeling and data base development, to support space control applications. ($1,000K)
- (U) Continued assessing HPM effects on representative military components. ($4,000K)
- (U) Continued to develop HPM technologies to support suppression of enemy air defense (SEAD) missions. ($2,677K)
- (U) The following bullet was accomplished under Project 2218:
- (U) Continued to assess lethality of DEW technologies against representative foreign systems/technologies. ($2,000K)
- (U) The following bullet was accomplished under Project 7601:
- (U) Continued to assess the vulnerability of various space assets to natural threats. ($1,500K)
- (U) The following bullet was accomplished in Project 8809:
- (U) Continued to assess the vulnerability of various space assets to man-made threats. ($2,000K)

(U) FY 1994 Planned Program:
- (U) Continue to develop generic advanced weapon technologies that support many Air Force applications. ($5,564K)
- (U) Continue to develop HPM technologies, including susceptibility and effects experiments, and modeling and data base development, to support space control applications. ($1,075K)
- (U) Continue assessing HPM effects on representative military components. ($1,700K)

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Begin to develop high power microwave (HPM) technologies to support airborne counter-air missions and command and control system suppression. ($2,125K)
- (U) Continue to develop HPM technologies to support suppression of enemy air defense (SEAD) missions. ($2,000K)
- (U) The following bullet is planned under Project 2218:
- (U) Continue to assess lethality of directed energy weapon (DEW) technologies against representative foreign systems/technologies. ($1,050K)
- (U) The following bullet is planned under Project 7601:
- (U) Continue to assess the vulnerability of various space assets to natural threats. ($785K)
- (U) The following bullet is planned in Project 8809:
- (U) Continue to assess the vulnerability of various space assets to man-made threats. ($521K)

(U) FY 1995 Planned Program:

- (U) Continue to develop generic advanced weapon technologies that support a wide range of Air Force applications. ($4,550K)
- (U) Continue to develop HPM technologies, including susceptibility and effects experiments, and modeling and data base development, to support space control applications. ($2,300K)
- (U) Continue assessing HPM effects on representative military components. ($1,651K)
- (U) Continue to develop HPM technologies to support airborne counter-air missions and command and control system suppression. ($2,170K)
- (U) Continue to develop HPM technologies to support SEAD missions. ($2,000K)
- (U) Begin development of HPM technologies for aircraft self-protection. ($1,800K)
- (U) Continue to assess lethality of DEW technologies against representative foreign systems/technologies. ($2,000K)
- (U) Continue to assess the vulnerability of various space assets to natural and man-made threats. ($2,034K)

(U) Work Performed By: The Phillips Laboratory, Kirtland AFB, NM, manages this program. The major contractors are: Maxwell Laboratories Inc., San Diego, CA; Logicon-RDA, Los Angeles, CA; Rockwell Rocketdyne, Canoga Park, CA; Kaman Sciences Corporation, Albuquerque, NM; and Science and Engineering Associates, Albuquerque, NM.

(U) Related Activities:

- (U) PE 0602120A, Electronic Survivability and Fuzing Technology.
- (U) PE 0602111N, Anti-Air/Anti-Surface Warfare Technology.
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0603605F, Advanced Weapons Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 8809, Satellite Technology: In FY 1995, this project consolidates Air Force space vehicle Exploratory Development technology efforts from several prior program elements/projects. The revised project focuses on four major areas: spacecraft platform technologies (e.g., structures, controls, power, and thermal management); space-based payload technologies (e.g., sensors, satellite communications, electronics, and software); vehicle integration related technologies (e.g., simulation and modeling of platform/payload merging); and launch vehicle technologies (e.g., astrodynamics and guidance, navigation, and control).

(U) FY 1993 Accomplishments:
- (U) Continued developing hardening technologies for space systems. ($2,000K)
- (U) The following effort was accomplished in PE 0602302F:
- (U) Continued to develop a wide range of technologies for advanced spacecraft platforms and payloads. ($11,554K)
- (U) The following effort was accomplished in PE 0602101F:
- (U) Continued to develop data collection platform integration technologies that support platforms such as balloons and sounding rockets. ($2,000K)

(U) FY 1994 Planned Program:
- (U) Continue developing hardening technologies for space systems. ($1,000K)
- (U) The following efforts are planned in PE 0602302F:
- (U) Continue developing a wide range of technologies for advanced spacecraft platforms and payloads. ($10,726K)
- (U) Develop thermionic space power technology. ($10,000K)
- (U) The following effort is planned in PE 0602101F:
- (U) Continued to develop data collection platform integration technologies that support platforms such as balloons and sounding rockets. ($1,500K)

(U) FY 1995 Planned Program:
- (U) Continue developing technologies for space platform subsystems such as cryocoolers for spacecraft thermal management and compact power cells. ($4,600K)
- (U) Continue developing technologies for space platform structures such as spacecraft structural controls for vibration suppression and composite structures. ($6,300K)
- (U) Continue developing technologies for space-based payload subsystems such as hardened passive sensors and satellite communications. ($6,000K)

Program Element: #0602601F
PE Title: Phillips Laboratory
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Continue developing technologies for space-based payload components such as hardened electronics and standardized, reusable software. ($4,397K)
- (U) Continue developing technologies that support generic spacecraft vehicle integration such as modeling and simulation of platform/payload merging. ($3,000K)
- (U) Continue developing technologies that support launch vehicles such as astrodynamics and guidance, navigation, and control technologies. ($2,000K)

(U) Work Performed By: The Phillips Laboratory, Kirtland AFB, NM, manages this program. The major contractors are: Harris Corp., Melbourne, FL; McDonnell Douglas Space Systems, Huntington Beach, CA; Boeing Aerospace, Seattle, WA; Martin-Marietta Astronautics, Denver, CO; and TRW Missile Systems, Redondo Beach, CA.

(U) Related Activities:
- (U) PE 0602203F, Aerospace Propulsion.
- (U) PE 0602102F, Materials.
- (U) PE 0603302F, Space and Missile Rocket Propulsion.
- (U) PE 0603311F, Ballistic Missile Technology.
- (U) PE 0603401F, Advanced Spacecraft Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602602F
PE Title: Conventional Munitions
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06AL Armament Directorate Operations	19,803	18,873	19,959	19,300	19,540	19,769	19,951	Cont	TBD
2068 Advanced Guidance Technology	5,476	4,780	8,525	9,423	9,937	9,795	9,784	Cont	TBD
2502 Ordnance Technology	5,580	7,065	8,685	9,605	10,127	9,981	9,970	Cont	TBD
2543 Weapons Effectiveness Methodology	887	782	1,409	1,558	1,644	1,621	1,618	Cont	TBD
2567 Aeromechanics Technology	4,333	3,358	6,107	6,753	7,120	7,018	7,010	Cont	TBD
Total	36,079	34,858	44,685	46,639	48,368	48,184	48,333	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development effort develops and establishes the feasibility of advanced technologies for air-to-air and air-to-surface conventional weapons to support non-nuclear Air Force missions. This program also funds the management and support of the Air Force Wright Laboratory Armament Directorate at Eglin AFB, FL.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 06AL, Armament Directorate Operations: This project supports and complements all other projects in the Program Element and provides for management, support, and operation of the Wright Laboratory Armament Directorate, Eglin AFB, FL. It provides civilian salaries, transportation, rents, maintenance, communications, supplies and equipment, and facilities maintenance.

2. (U) Project 2068, Advanced Guidance Technology: This project develops (1) precision guidance technologies for air-launched conventional weapons and (2) instrumentation technology and techniques. Project payoffs include: adverse-weather and "launch and leave" precision guidance capability; increased number of kills per sortie; increased aircraft survivability; improved reliability and affordability; reduced test costs; shorter development programs; and more thoroughly tested weapon systems. Increase in FY 1995 funding from FY 1994 level is due to higher priority given to developing affordable precision guidance technologies.

Program Element: #0602602F
PE Title: Conventional Munitions
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate guidance component technology for low-cost precision adverse-weather, autonomous seekers. ($3,660K)
- (U) Continued to develop and demonstrate advanced weapons simulation capability. ($436K)
- (U) Continued to develop and demonstrate instrumentation for weapons test and evaluation. ($1,380K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate guidance component technology for low-cost precision adverse-weather, autonomous seekers. ($2,544K)
- (U) Develop and demonstrate advanced weapons simulation capability. ($746K)
- (U) Develop and demonstrate instrumentation for weapons test and evaluation. ($1,490K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate guidance component technology for low-cost precision adverse-weather, autonomous seekers. ($4,503K)
- (U) Develop and demonstrate advanced weapons simulation capability. ($1,366K)
- (U) Develop and demonstrate instrumentation for weapons test and evaluation. ($2,656K)

(U) Work Performed By: This project is managed by Wright Laboratory, Eglin AFB, FL. Major contractors are: Harris Corp., Melbourne, FL; Raytheon Co., Bedford, MA; Loral, Akron, OH; Electro Systems International, Kennesaw, GA; and Texas Instruments, Dallas, TX.

(U) Related Activities:
- (U) PE 0603601F, Conventional Weapons Technology.
- (U) PE 0604314F, Advanced Medium Range Air-to-Air Missile.
- (U) PE 0604940D, Central Test and Evaluation Improvement Program.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2502, Ordnance Technology: This project develops technologies for advanced weapon dispensers, submunitions, safe and arm devices, fuzes, explosives, and warheads for air-to-surface and air-to-air conventional weapons. The payoffs include: improved storage capability and transportation safety of fully assembled weapons; improved non-nuclear warhead and fuze effectiveness; improved submunition dispensing; and selectable multi-mode kill capability.

Program Element: #0602602F
PE Title: Conventional Munitions
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate fuze technology to reduce cost and increase supportability, safety, and performance. ($1,572K)
- (U) Continued to develop and demonstrate affordable explosives for higher performance and lower sensitivity. ($1,259K)
- (U) Continued to develop and demonstrate advanced analytical tools for calculating weapons effects to reduce development time and cost. ($858K)
- (U) Continued to develop and demonstrate advanced warhead development technologies. ($1,891K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate fuze technology to reduce cost and increase supportability, safety, and performance. ($1,369K)
- (U) Develop and demonstrate affordable explosives for higher performance and lower sensitivity. ($1,069K)
- (U) Develop and demonstrate advanced analytical tools for calculating weapons effects to reduce development time and cost. ($535K)
- (U) Develop and demonstrate advanced warhead development technologies. ($4,092K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate fuze technology to reduce cost and increase supportability, safety, and performance. ($2,583K)
- (U) Develop and demonstrate affordable explosives for higher performance and lower sensitivity. ($2,150K)
- (U) Develop and demonstrate advanced analytical tools for calculating weapons effects to reduce development time and cost. ($765K)
- (U) Develop and demonstrate advanced warhead development technologies and advanced kill mechanisms for materiel target defeat. ($3,187K)

(U) Work Performed By: This project is managed by Wright Laboratory, Eglin AFB, FL. Major contractors are: Martin Marietta, Orlando, FL; Honeywell, Hopkins, MN; Diversified Engineering Inc., Richmond, VA; Motorola Inc., Scottsdale, AZ; and KDI Precision Products, Cincinnati, OH.

(U) Related Activities:
- (U) PE 0603601F, Conventional Weapons Technology.
- (U) PE 0604314F, Advanced Medium Range Air-to-Air Missile.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0602602F
PE Title: Conventional Munitions
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

4. (U) Project 2543, Weapons Effectiveness Methodology: This project assesses the lethality and effectiveness of current and planned air-to-surface and air-to-air conventional weapons technology programs, and assesses the vulnerability of targets against which our conventional weapons are designed.

(U) FY 1993 Accomplishments:
- (U) Continued to extend effectiveness vulnerability assessment code to increase prediction accuracy of currently covered target sets and new target sets. ($520K)
- (U) Continued to develop and demonstrate, through analytical methods, new mechanisms of coupling destructive energy into the target. ($367K)

(U) FY 1994 Planned Program:
- (U) Extend effectiveness vulnerability assessment code to increase prediction accuracy of deeply buried hardened target facilities. ($500K)
- (U) Develop and demonstrate new analytical methods for assessing the coupling of destructive energy into the target. ($282K)

(U) FY 1995 Planned Program:
- (U) Extend effectiveness vulnerability assessment code to increase prediction accuracy of hardened facilities protected by large amounts of concrete overburden. ($900K)
- (U) Develop and demonstrate analytical methods of predicting the coupling of destructive energy into the target. ($509K)

(U) Work Performed By: This project is managed by Wright Laboratory, Eglin AFB, FL. The contractor is Denver Research Institute, Denver, CO.

(U) Related Activities:
- (U) PE 0603601F, Conventional Weapons Technology.
- (U) PE 0604602F, Armament Ordnance Development.
- (U) PE 0604604F, Submunitions Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0602602F
PE Title: Conventional Munitions
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

5. (U) Project 2567, Aeromechanics Technology: This project develops technologies to improve the aerodynamic performance, survivability, and effectiveness of conventional air-to-surface weapons and air-to-air weapons. These technologies provide: low-cost airframe/subsystem components and structures; reduced aircraft/weapons drag and radar signature; and advanced midcourse guidance equipment for advanced missile airframes. Increase in FY 1995 funding over FY 1994 level is due to increased emphasis on developing affordable technologies for weapon/aircraft integration, weapons airframes, and midcourse guidance.

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate advanced navigation/control technologies for weapons airframes. ($1,401K)
- (U) Continued to develop and demonstrate computational fluid dynamics store separation codes and aeroballistic analysis to enhance weapon design and reduce the cost/schedule of weapons testing/certification. ($1,091K)
- (U) Continued to develop and demonstrate advanced weapon airframe and carriage technology. ($1,841K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate advanced navigation/control technologies for weapons airframes. ($2,466K)
- (U) Develop and demonstrate computational fluid dynamics store separation codes and aeroballistic analysis to enhance weapon design and reduce the cost/schedule of weapons testing/certification. ($842K)
- (U) Develop and demonstrate advanced weapon airframe and carriage technology. ($50K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate advanced navigation/control technologies for weapons airframes. ($4,361K)
- (U) Develop and demonstrate computational fluid dynamics store separation codes and aeroballistic analysis to enhance weapon design and reduce the cost/schedule of weapons testing/certification. ($1,546K)
- (U) Develop and demonstrate advanced weapon airframe and carriage technology. ($200K)

(U) Work Performed By: This project is managed by Wright Laboratory, Eglin AFB, FL. Major contractors are: McDonnell Douglas, St. Louis, MO; Loral Aeronutronic, Newport Beach, CA; Honeywell, Minneapolis, MN; Harris Corp., Melbourne, FL; and Raytheon Corp., Sudbury, MA.

(U) Related Activities:
- (U) PE 0603601F, Conventional Weapons Technology.
- (U) PE 0604602F, Armament Ordnance Development.
- (U) PE 0604604F, Submunitions Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
06RA C3 Laboratory Operations	41,733	42,134	41,225	43,080	45,000	47,045	49,160	Cont	TBD
2338 Reliability Sciences Technology	4,652	5,190	5,515	5,380	5,330	5,275	5,080	Cont	TBD
4506 Surveillance Technology	7,332	8,925	10,305	10,050	10,000	9,755	9,490	Cont	TBD
4519 Communications Technology	4,174	7,060	8,140	7,940	7,900	7,685	7,500	Cont	TBD
4594 Information Technology	6,402	7,475	8,505	8,295	8,355	8,035	7,835	Cont	TBD
4600 Electromagnetic Technology	9,691	11,500	12,109	11,798	11,842	11,418	11,196	Cont	TBD
5581 Command and Control (C2) Technology	6,962	8,148	9,645	9,405	9,505	9,200	8,880	Cont	TBD
Total	80,946	90,432	95,444	95,948	97,932	98,413	99,141	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Exploratory Development program is the primary source of new concepts, feasibility demonstrations, and advanced technology for Air Force C3. Current developments include: increased operational availability of C3 systems through improving reliability, diagnostic capability, and electromagnetic environmental performance; improving effectiveness and survivability through secure communications; improving surveillance range and detection capabilities against low-observable threats and enemy electronic countermeasures; and improving the timeliness and quality of data acquisition for decision making. The program addresses six technology areas: reliability sciences; surveillance; communications; information; electromagnetics; and command and control.

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) Project 06RA, C3 Laboratory Operations: This project provides for the management, support, and operation of Rome Laboratory, Griffiss AFB, NY, and the two directorates of Rome Laboratory at Hanscom AFB, MA. It provides: the pay and related cost of civilian scientists, engineers, and support personnel; transportation of equipment, rents; communications and utilities costs; reproduction services; and procurement of supplies, equipment, and contractor support services for these facilities. Funds support and complement other projects within the PE.

2. (U) Project 2338, Reliability Sciences Technology: The Air Force needs technology which increases reliability and diagnostic capability for electronic devices and systems while assessing electromagnetic environmental performance. Payoffs are increased system availability and lower life cycle costs. This effort focuses on technology to identify and eliminate design and fabrication characteristics that result in poor reliability. It develops equipment and system reliability and diagnostic techniques to be applied in development of military systems with improved operational readiness and supportability. Areas of emphasis include: electronic technology reliability assessment; diagnostic development and integration; and design for reliability.

(U) FY 1993 Accomplishments:
- (U) Developed advanced electronic technology reliability assessment techniques to assess reliability of new devices in an operational environment and recommended corrective actions, risk mitigation procedures, and redesign approaches for the devices. ($1,240K)
- (U) Developed enabling diagnostics technologies and integrated them into existing diagnostic tools and techniques to address high-priority user needs in the area of tools and data standards. ($1,550K)
- (U) Developed enabling design for reliability technologies to create reliability tools, techniques, and guidelines to improve C3 devices through a system design process. ($1,862K)

(U) FY 1994 Planned Program:
- (U) Develop enabling electronic technology reliability assessment techniques to assess the reliability of new devices in an operational environment and recommend corrective actions, risk mitigation procedures, and redesign approaches for the devices. ($1,385K)
- (U) Develop enabling diagnostics technologies and integrate them into existing diagnostic tools and techniques to address high-priority user needs in the area of tools and data standards. ($1,730K)
- (U) Develop enabling design for reliability technologies to create reliability tools, techniques, and guidelines to improve C3 devices through a system design process. ($2,075K)

(U) FY 1995 Planned Program:
- (U) Develop enabling electronic technology reliability assessment techniques to assess the reliability of new devices in an operational environment and recommend corrective actions, risk mitigation procedures, and redesign approaches for the devices. ($1,470K)

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) Develop enabling diagnostics technologies and integrate them into existing diagnostic tools and techniques to address high-priority user needs in the area of tools and data standards. ($1,840K)
- (U) Develop enabling design for reliability technologies to create reliability tools, techniques, and guidelines to improve C3 devices through a system design process. ($2,205K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: General Electric, Pittsfield, MA; General Electric, Morristown, NJ; University of Maryland, College Park, MD; Honeywell Inc., Minneapolis, MN; and TRW, Redondo Beach, CA.

(U) Related Activities:
- (U) PE 0603617F, C3 Applications.
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603728F, Advanced Computer Technology.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) PE 0604609F, Reliability and Maintainability Technology Insertion Program.
- (U) PE 0708026F, Producibility, Reliability, Availability, and Maintainability.
- (U) This program has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 4506, Surveillance Technology: The Air Force needs advanced surveillance technologies to improve the performance and reduce the cost of Air Force surveillance systems. Major Exploratory Development programs include: low-observable surveillance; passive surveillance; and advanced processing technologies. Technologies being developed include: advanced non-cooperative bistatics; space-time processing; sensor and data fusion; signal generation and control; advanced array antennas; and radar target imaging techniques.

(U) FY 1993 Accomplishments:
- (U) Developed and demonstrated advanced sensor technology algorithms through analysis of real-time multichannel airborne measurements to provide small target detection in a complex electromagnetic background. ($3,217K)
- (U) Developed enabling technologies for Electronic Support Measures (ESM), bistatic detection, track, and classification in severe clutter and jamming environments. ($2,145K)
- (U) Integrated off-board and on-board sensor requirements into high-confidence target detection, fusion, and classification technologies. ($1,970K)

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate advanced sensor technology algorithms through analysis of real-time multichannel airborne measurements to provide small target detection in a complex electromagnetic background. ($3,915K)
- (U) Develop enabling technologies for Electronic Support Measures (ESM)/bistatic detection, track, and classification in severe clutter and jamming environments. ($2,610K)
- (U) Integrate off-board and on-board sensor requirements into high-confidence target detection, fusion, and classification technologies. ($2,400K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate advanced sensor technology algorithms through analysis of real-time multichannel airborne measurements to provide small target detection in a complex electromagnetic background. ($4,505K)
- (U) Develop enabling technologies for ESM/bistatic detection, track, and classification in severe clutter and jamming environments. ($3,000K)
- (U) Integrate off-board and on-board sensor requirements into high-confidence target detection, fusion, and classification technologies. ($2,800K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: SENESIS, DeWitt, NY; Westinghouse Electric, Baltimore, MD; Syracuse Research Corp., Syracuse, NY; Raytheon Co., Sudbury, MA; and Calspan Corp., Buffalo, NY.

(U) Related Activities:
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 4519, Communications Technology: The Air Force needs technologies which will provide global communications that enable the rapid application of air combat power via assured connectivity for timely, reliable, responsive, affordable transfer of information using all available communications media to support rapid build-up of U.S. presence abroad. This program provides the technologies for: enduring multi-level, secure, seamless networks; advanced communications processors; anti-jam (AJ) and low probability of intercept (LPI) techniques such as spread spectrum and adaptive null steering; lightweight spacecraft antennas including high effective isotropic radiated power (EIRP) satellite space

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

communications transmit phased array antennas; and modular, programmable, low-cost radios and satellite terminals for ground, airborne, and space C3 across the electromagnetic and optical spectrums. It includes electronic and photonic technologies for advanced processors and devices, laser communications technologies, advanced network protocols, artificial intelligent communications management and control, and advanced algorithms and enabling processing techniques.

(U) FY 1993 Accomplishments:
- (U) Developed critical space, ground, and air communications technologies employing programmable devices, enabling processing technologies, and monolithic microwave integrated circuits to provide survivable radios and transceivers. ($1,514K)
- (U) Developed enabling communications network technologies needed for improved security, survivability, timeliness, and reconstruction of communications networks. ($1,450K)
- (U) Developed advanced electronic and photonic processors, advanced network protocols, and advanced algorithms and enabling processing technologies needed for survivable communications. ($1,210K)

(U) FY 1994 Planned Program:
- (U) Develop critical space, ground, and air communications technologies employing programmable devices, enabling processing technologies, and monolithic microwave integrated circuits to provide survivable radios and transceivers. ($2,565K)
- (U) Develop enabling communications network technologies needed for improved security, survivability, timeliness, and reconstruction of communications networks. ($2,450K)
- (U) Develop advanced electronic and photonic processors, advanced network protocols, and advanced algorithms and enabling processing technologies needed for survivable communications. ($2,045K)

(U) FY 1995 Planned Program:
- (U) Develop critical space, ground and air communications technologies employing programmable devices, enabling processing technologies, and monolithic microwave integrated circuits to provide survivable radios and transceivers. ($2,955K)
- (U) Develop enabling communications network technologies needed for improved security, survivability, timeliness, and reconstruction of communications networks. ($2,825K)
- (U) Develop advanced electronic and photonic processors, advanced network protocols, and advanced algorithms and enabling processing technologies needed for survivable communications. ($2,360K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: Westinghouse Electric, Baltimore, MD; University of Massachusetts, Amherst, MA; Physical Optics Corp., Torrance, CA; Cornell University, Ithaca, NY; and ITT Avionics Corp., Nutley, NJ.

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

(U) Related Activities:
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603728F, Advanced Computer Technology.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 4594, Information Technology: The Air Force needs technologies which improve and automate Air Force capabilities to process, fuse, generate, exploit, interpret, and disseminate useful and timely information. This project: improves recording, storage, and retrieval of high data rate, large volume data; develops speech processing technologies for signal exploitation, information deception, and exploratory unintentional emissions; develops technology for correlation and fusion of multisource data; provides advanced processing techniques for receipt, correlation analysis, and display of target reports from advanced sensor systems; supports advanced weapon systems through the exploration of multispectral, multisource imagery; and provides advanced techniques for mapping, charting, and geodesy data processing.

(U) FY 1993 Accomplishments:
- (U) Developed enabling processing technologies responsive to operational deficiencies by improving timeliness, reliability, and accessibility of information to the warfighter. ($3,000K)
- (U) Developed information data handling techniques to automatically extract event data and update databases for prediction purposes. ($1,700K)
- (U) Developed sensor exploitation techniques for faster and more efficient imaging to support targeting, planning, and mission execution. ($1,702K)

(U) FY 1994 Planned Program:
- (U) Develop enabling processing technologies responsive to operational deficiencies by improving timeliness, reliability, and accessibility of information to the warfighter. ($3,050K)
- (U) Develop information data handling techniques to automatically extract event data and update databases for prediction purposes. ($2,200K)
- (U) Develop sensor exploitation techniques for faster and more efficient imaging to support targeting, planning, and mission execution. ($2,225K)

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

(U) FY 1995 Planned Program:
- (U) Develop enabling processing technologies responsive to operational deficiencies by improving timeliness, reliability, and accessibility of information to the warfighter. ($3,650K)
- (U) Develop information data handling techniques to automatically extract event data and update databases for prediction purposes. ($2,400K)
- (U) Develop sensor exploitation techniques for faster and more efficient imaging to support targeting, planning, and mission execution. ($2,455K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: Harris Corp., Melbourne, FL; Boeing Defense and SPC, Seattle, WA; State University-Rutgers, Piscataway, NJ; BBN Systems and Technology, Cambridge, MA; and PAR Government Systems Corp., New Hartford, NY.

(U) Related Activities:
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

6. (U) Project 4600, Electromagnetic Technology: This project consists of three subsets of technology: electromagnetics; solid state sciences; and photonics. Future surveillance, communications, and information processing systems will require improved technology for the generation, control, processing, and radiation of electromagnetic and optical energy to reduce system cost, improve system sensitivity, and increase processing rates. Promising technologies for improving C3 systems are electromagnetic propagation and scattering (from targets and clutter), and monolithic microwave and millimeter wave integrated components and antennas. This project develops: a technology base for electronic and photonic devices and device materials for C3 systems; optical technology for electronic data processing and storage; real-time target recognition and high-speed fiber optic interconnects; control techniques for large phased array antennas; and characterizes phenomena for low-observable surveillance.

(U) FY 1993 Accomplishments:
- (U) Developed enabling electromagnetic technologies for advanced surveillance and communications systems to include: small target detection and tracking; communication terminals; and antenna life cycle cost. ($2,800K)

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

- (U) Developed advanced materials and components capable of higher processing speeds and power for telecommunications and survivable server applications. ($2,066K)
- (U) Developed photonic components and related materials for insertion into core C3 programs. ($4,825K)

(U) FY 1994 Planned Program:
- (U) Develop enabling electromagnetic technologies for advanced surveillance and communications systems to include: small target detection and tracking; communication terminals; and antenna life cycle cost. ($3,400K)
- (U) Develop advanced materials and components capable of higher processing speeds and power for telecommunications and survivable server applications. ($2,600K)
- (U) Develop photonic components and related materials for insertion into core C3 programs. ($5,500K)

(U) FY 1995 Planned Program:
- (U) Develop enabling electromagnetic technologies for advanced surveillance and communications systems to include: small target detection and tracking; communication terminals; and antenna life cycle cost. ($3,900K)
- (U) Develop advanced materials and components capable of higher processing speeds and power for telecommunications and survivable server applications. ($3,000K)
- (U) Develop photonic components and related materials for insertion into core C3 programs. ($5,209K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: U.S. Small Business Corp., San Antonio, TX; University of Rochester, Rochester, NY; SRI International, Menlo Park, CA; Honeywell Sensor and Systems; Minneapolis, MN; and University of Massachusetts, Amherst, MA.

(U) Related Activities:
- (U) PE 0603617F, C3 Applications.
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Nunn Amendment program with Australia to characterize ionospheric clutter

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2. Exploratory Development
Old Budget Activity: #1. Technology Base

Date: February 1994

7. (U) Project 5581, Command and Control (C2) Technology: The Air Force needs technologies which provide next generation battlefield commanders with improved processing and presentation of information for real-time battle management. Technologies being developed will increase capability, quality, and reliability while reducing the cost of computer resources in C2 systems. This project develops advanced computer software modeled after human information processing and is capable of providing vast improvements in military decision making. It also develops software engineering tools, software development methodologies, and software quality specifications and assessments. It develops: technology for distributed systems, data bases, and fault tolerance mechanisms; and knowledge-based technologies, systems, and data bases.

(U) FY 1993 Accomplishments:
- (U) Developed enabling information technologies for real-time battle management and Command and Control (C2) to support time-critical air operations. ($3,142K)
- (U) Developed enabling software technologies to provide increased capability, quality, and reliability while reducing support cost. ($2,025K)
- (U) Developed enabling distributed computing database systems using cluster technologies to allow secure management of multimedia data by theater commanders. ($1,795K)

(U) FY 1994 Planned Program:
- (U) Develop enabling information technologies for real-time battle management and C2 to support time-critical air operations. ($3,673K)
- (U) Develop enabling software technologies to provide increased capability, quality, and reliability while reducing support cost. ($2,645K)
- (U) Develop enabling distributed computing database systems using cluster technologies to allow secure management of multimedia data by theater commanders. ($1,830K)

(U) FY 1995 Planned Program:
- (U) Develop enabling information technologies for real-time battle management and C2 to support time-critical air operations. ($4,310K)
- (U) Develop enabling software technologies to provide increased capability, quality, and reliability while reducing support cost. ($3,120K)
- (U) Develop enabling distributed computing database systems using cluster technologies to allow secure management of multimedia data by theater commanders. ($2,215K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: SRI International, Menlo Park, CA; General Electric, Schenectady, NY; Massachusetts Institute of Technology, West Newton, MA; Park Mathematical, Carlisle, MA; and Kestrel, Palo Alto CA.

(U) Related Activities:
- (U) PE 0603617F, C3 Applications.
- (U) PE 0603728F, Advanced Computer Technology.

Program Element: #0602702F
PE Title: Command, Control, and Communications (C3)
Budget Activity: #2, Exploratory Development
Old Budget Activity: #1, Technology Base

Date: February 1994

- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) PE 0303401F, Communications-Computer Systems (C-CS) Security RDT&E.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603106F
PE Title: Logistics Systems Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2745 Logistics for Contingency Operations and Weapon Systems Support	4,339	3,908	6,260	5,080	6,070	6,520	6,106	Cont	TBD
2940 Technology for Design and Maintenance	6,886	5,904	5,936	6,472	6,258	6,472	6,088	Cont	TBD
2950 Improved Logistics and Maintenance Performance	4,389	4,426	6,004	6,497	6,350	6,619	6,033	Cont	TBD
Total	15,614	14,238	18,200	18,049	18,678	19,611	18,227	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops and demonstrates technology to reduce the cost and improve the design, acquisition, and supportability of current and future weapon systems. This program will improve the way maintenance and support considerations are designed into weapon systems and make engineering, product support, and maintenance data electronically available throughout the lifetime of the weapon systems. It will provide more realistic simulation-based logistics planning and combat capability assessment models; provide critical risk-reduction technology; and accelerate development and implementation of near-term logistics technology to shorten the time needed to meet priority logistics supportability requirements for existing systems and allow for more rapid and flexible deployment. This program also includes test and diagnostic technologies, flight-line support, critical aircraft battle/accident damage assessment and repair (ABDAR) technology, military aircraft fire suppression agents, and other logistic technologies.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995

1. (U) Project 2745, Logistics for Contingency Operations and Weapon Systems Support: This project develops, demonstrates, and transitions technology to improve the performance and supportability of Air Force weapon systems in peacetime and deployed wartime environments. This project will develop and demonstrate the technologies needed for more reliable aircraft support equipment, enhance our capability to rapidly return battle damaged aircraft to a combat ready status, and support rapid and flexible deployments.

(U) FY 1993 Accomplishments:
- (U) Completed plan for Halon 1301 replacement; started agent screening tests ($3,600K)
- (U) Demonstrated field repair of damaged aircraft fuel tanks, field tested aircraft repair for multi-contour surfaces ($150K)
- (U) Continued technology development/field test of ABDAR tools and equipment technologies ($589K)

Program Element: #0603106F
PE Title: Logistics Systems Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program.
- (U) Complete Halon replacement screening, begin full-scale testing of replacement agents; select best agent(s). ($3,278K)
- (U) Begin development of advanced aircraft battle damage repair techniques for composites and low-observable materials ($225K)
- (U) Begin technology development of transparent repair techniques for battle damaged cockpit canopies and windscreens ($105K)
- (U) Identify, develop, and field assess special-purpose battle damage repair tools and equipment. ($300K)

(U) FY 1995 Planned Program:
- (U) Continue Halon fire suppression replacement technology. ($3,875K)
- (U) Continue transparent repair of windscreens and canopies ($200K)
- (U) Continue composite and low-observable repair technology development. ($1,900K)
- (U) Continue development/field test of aircraft battle/accident damage assessment and repair (ABDAR) technology ($285K)

(U) Work Performed By: This project is managed by Armstrong Laboratory, Wright-Patterson AFB, OH. Efforts executed in-house by both Armstrong Laboratory and Wright Laboratory, Wright-Patterson AFB, OH.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602205F, Personnel, Training, and Simulation
- (U) PE 0603721N, Integrated Diagnostic Support
- (U) PE 0605801A, Pollution Prevention Research and Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2940, Technology for Design and Maintenance: This project develops new technologies to enable design, procurement, repair, and modification of more supportable and affordable weapon systems These technologies permit integration of design trade off decisions among survivability, producibility, and supportability including development and use of analyses to assess impacts on system supportability while initiatives are still in the concept design stage Sample payoffs include a 50-1 return on investment by preventing costly manufacturing rework and design flaws through better initial design, 50% reductions in retrofit costs for modifications, and large reductions in support costs

(U) FY 1993 Accomplishments:
- (U) Demonstrated assessment tools for integrated reliability and maintainability design. ($787K)

Program Element: #0603106F
PE Title Logistics Systems Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date February 1994

- (U) Developed new computer-based man-model of a maintenance technician for design of more maintainable weapon systems ($1,617K)
- (U) Developed information analysis to reduce costs and improve product control. ($1,950K)
- (U) Developed software/hardware engineering analysis tools and interface designs for more reliable/maintainable equipment ($1,620K)
- (U) Developed technology to assess operational reliability and maintainability of support equipment and to improve logistics decision making and workflow ($912K)

(U) FY 1994 Planned Program
- (U) Build advanced database technology for logistics users to better manage digital technical data. ($744K)
- (U) Develop software tools to simulate operator consoles for man-machine functional trade offs during design. ($800K)
- (U) Develop advanced information analysis tools to reduce costs and improve product control ($1,000K)
- (U) Develop software/hardware engineering analysis tools and interface designs for more reliable/maintainable equipment ($2,227K)
- (U) Develop technology to assess operational reliability and maintainability of support equipment and to improve logistics decision making and workflow. ($1,133K)

(U) FY 1995 Planned Program.
- (U) Begin technology development to make logistics workflows more efficient ($1,108K)
- (U) Conduct technology demonstrations of advanced database tools to increase efficiency of aircraft modification process ($300K)
- (U) Develop integrated group engineering and logistics design and support technologies ($296K)
- (U) Develop business re-engineering and process improvement tools for logistics operations. ($1,367K)
- (U) Develop technology for animated computer man-models to improve reliability/maintainability of aircraft ground support equipment ($1,996K)
- (U) Develop software/hardware engineering analysis tools for improved man-machine interface designs ($869K)

(U) Work Performed By. This project is managed by the Armstrong Laboratory, Wright-Patterson AFB, OH. The major contractors are Hughes Aircraft, San Diego, CA, NCI Information Systems, McLean, VA, BBN, Cambridge, MA, and Knowledge-Based Systems Inc , College Station, TX.

(U) Related Activities:
- (U) PE 0602205F, Personnel, Training, and Simulation
- (U) PE 0604740F, Computer Resource Management Technology.
- (U) PE 0708011F, Manufacturing Technology
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds Not Applicable.

Program Element #0603106F
PE Title. Logistics Systems Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date February 1994

(U) International Cooperative Agreements: Not Applicable

3 (U) Project 2950, Improved Logistics and Maintenance Performance This project develops technologies that will improve logistics and maintenance support including. development and demonstration of technology essential to field and depot maintenance operations, implementation of near-term logistics technology to shorten the time between user requirement and usable product delivery; and development and field demonstration of technologies for the flightline and Air Logistics Center maintenance technicians. This includes technology for replacement of the paper-based Technical Order System and integration of all technical and support information required by the technician to inspect, troubleshoot, repair, and report actions taken through use of a hand-held computer maintenance aid Estimated savings are in the hundreds of millions of dollars for both operational commands and depot maintenance operations. Technologies developed in the project are closely coordinated with all three Services and products are now being applied to many current and future systems such as the F-16, Joint Surveillance and Target Attack Radar System (J-STARS), B-2, F-22, and the Army M1A1 tank. Industry and the Federal Aviation Administration are also applying these technologies to improve maintenance and support of commercial airlines and automobiles

(U) FY 1993 Accomplishments
- (U) Completed working portable maintenance aid to display Integrated Maintenance Information System (IMIS) technology ($2,500K)
- (U) Completed final draft of the Tri-Service Integrated Electronic Technical Manual (IETM) specifications. ($198K)
- (U) Completed the maintenance diagnostics and troubleshooting module for integration into the IMIS system. ($810K)
- (U) Completed design/build of a portable maintenance computer and software for use in field assessment ($881K)

(U) FY 1994 Planned Program:
- (U) Complete software for IMIS field demonstration ($2,000K)
- (U) Begin base-level IMIS field test on F-16 ($1,000K)
- (U) Complete draft specifications for IMIS technology; make information available to the F-22 and F-16 System Program Offices (SPOs) ($1,000K)
- (U) Begin analysis of logistics and maintenance support implications of flightline maintenance during combat, employing technologies for diagnostics and technical data. ($290K)
- (U) Begin analysis of logistics needs to asses benefits of IMIS technologies to major logistics operations ($136K)

(U) FY 1995 Planned Program:
- (U) Complete cost-benefit/user requirements analysis for electronic technical data use in depot maintenance ($1,852K)
- (U) Begin development of electronic tools for flightline diagnostics and assessment to improve aircraft turn-around time for maintenance during combat ($1,800K)
- (U) Begin technology development for improved wing level planning/control of logistics assets at home station and deployments ($511K)
- (U) Begin to develop logistics readiness/deployment analysis methods for contingency operations ($541K)
- (U) Assess IMIS technologies for major logistics operations ($1,300K)

Program Element #0603106F
PE Title. Logistics Systems Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) Work Performed By. This project is managed by Armstrong Laboratory, Wright-Patterson AFB, OH. The major contractors are: ARC, Dayton, OH; GDE Systems, San Diego, CA; Lockheed, Fort Worth, TX, RJO Corp , Dayton, OH, and NCI, Dayton, OH

(U) Related Activities:
- (U) PE 0207219F, Advanced Tactical Fighter.
- (U) PE 0602205F, Personnel, Training, and Simulation
- (U) PE 0603721N, Integrated Diagnostic Support.
- (U) PE 0604708F, Generic Integrated Maintenance Diagnostics Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements. Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603112F
PE Title: Advanced Materials for Weapon Systems
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2100 Laser Hardened Materials	9,775	8,682	9,900	11,081	11,687	11,571	11,105	Cont	TBD
3153 Non-Destructive Inspection Development	3,127	3,170	4,019	4,120	4,268	4,225	4,056	Cont	TBD
3946 Materials Transition	3,777	10,846*	5,981	5,198	5,177	5,125	4,920	Cont	TBD
Total	16,679	22,698	19,900	20,399	21,132	20,921	20,081	Cont	TBD

*Includes $7.0M Congressional add to establish National Center for Industial Competitiveness (NCIC).

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops, demonstrates, and transitions laser hardening techniques, Non-Destructive Inspection/Evaluation (NDI/E), and technology maturation of new aerospace materials. The overall program plan is to meet the customers' requirements as set in their Mission Need Statements, Logistics Needs, and program reviews. The developed material technologies improve the affordability, supportability, reliability, survivability, and operational performance of current and future warfighting systems.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2100, Laser Hardened Materials: Develops new materials and concepts for protecting Air Force assets such as aircrews, munitions, sensors, transparencies, and structures against laser radiation. The goal is to ensure mission capability before, during, and after laser exposure. The world laser market is rapidly expanding with easy export to any nation. Survivability solutions must account for a variety of lasers facing a mission. Current protection schemes are activated by intensity or color and are only capable of countering a specific portion of the laser threat. To harden systems against all potential lasers, a combination of approaches is required. Concepts are demonstrated on representative hardware to ensure that validated hardening options are available for transition to Air Force systems.

   (U) FY 1993 Accomplishments:
   - (U) Developed advanced materials technologies that enhance laser hardening for Air Force aircraft structures. ($1,075K)
   - (U) Developed advanced materials technologies that enhance laser hardening for Air Force aircrews. ($4,184K)
   - (U) Developed advanced materials technologies that enhance laser hardening for sensors, avionics, and components ($4,516K)

Program Element: #0603112F
PE Title: Advanced Materials for Weapon Systems
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop advanced materials technologies that enhance laser hardening for Air Force aircraft structures. ($1,152K)
- (U) Develop advanced materials technologies that enhance laser hardening for Air Force aircrews. ($4,042K)
- (U) Develop advanced materials technologies that enhance laser hardening for sensors, avionics, and components. ($3,488K)

(U) FY 1995 Planned Program:
- (U) Develop advanced materials technologies that enhance laser hardening for Air Force aircraft structures ($1,201K)
- (U) Develop advanced materials technologies that enhance laser hardening for Air Force aircrews. ($4,554K)
- (U) Develop advanced materials technologies that enhance laser hardening for sensors, avionics, and components. ($4,145K)

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are: Hughes Aircraft Co., El Segundo, CA; McDonnell-Douglas Corp., St. Louis, MO; Lawrence Associates Inc., Dayton, OH; Martin-Marietta, Orlando, FL; and Rockwell Science Center, Thousand Oaks, CA.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0604706F, Life Support System.
- (U) PE 0708011F, Industrial Base Program.
- (U) Coordinated through the Tri-Service Laser Hardening Materials and Structures Working Group and the Joint Service Agile Laser Eye Protection Program.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 3153, Non-Destructive Inspection Development: Develops and demonstrates advanced Non-Destructive Inspection/Evaluation (NDI/E) methods and procedures to monitor performance integrity and to detect failure causing conditions in weapon system components and materials. NDI/E capabilities greatly influence and/or limit many designs, manufacturing, and maintenance practices. Reduction in the number of fighter wings and the need for rapid sortie generation demand an ability to perform real-time NDI/Es faster than current capability. This project provides technology to satisfy critical Air Force requirements to extend lifetimes of current systems through increased reliability and cost-effectiveness at field and depot maintenance levels, as well as assuring manufacturing quality, integrity, and safety requirements.

(U) FY 1993 Accomplishments:
- (U) Developed advanced ultrasonic Non-Destructive Inspection/Evaluation (NDI/E) technologies for improved capabilities in materials testing, monitoring, inspection, and maintenance. ($1,440K)

Program Element: #0603112F
PE Title: Advanced Materials for Weapon Systems
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) Developed advanced electromagnetic radiation (i.e., x-ray, gamma-ray, and laser) Non-Destructive Inspection/Evaluation (NDI/E) technologies for improved capabilities in materials testing, monitoring, inspection, and maintenance. ($1,687K)

(U) FY 1994 Planned Program:
- (U) Continue development of advanced ultrasonic NDI/E technologies for improved capabilities in materials testing, monitoring, inspection, and maintenance. ($1,667K)
- (U) Continue development of advanced electromagnetic radiation (i.e., x-ray, gamma-ray, and laser) NDI/E technologies for improved capabilities in materials testing, monitoring, inspection, and maintenance ($1,503K)

(U) FY 1995 Planned Program:
- (U) Continue development of advanced ultrasonic NDI/E technologies for improved capabilities in materials testing, monitoring, inspection, and maintenance. ($1,809K)
- (U) Continue development of advanced electromagnetic radiation (i.e., x-ray, gamma-ray, and laser) NDI/E technologies for improved capabilities in materials testing, monitoring, inspection, and maintenance. ($2,210K)

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are: Boeing Aerospace Co., Seattle, WA; General Dynamics, Ft. Worth, TX; McDonnell Aircraft Co., St. Louis, MO; Lockheed Missile and Space, Sunnyvale, CA; and Rockwell Science Center, Thousand Oaks, CA.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0708011F, Manufacturing Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3946, Materials Transition: Develops processing and scale-up data on new materials to achieve their acceptance by designers, to shorten transition time into applications, and to provide the initial incentive for their industrial development.

(U) FY 1993 Accomplishments:
- (U) Developed technologies and data bases to facilitate timely transition of advanced structures, propulsion, and subsystems materials to warfighters, industry, and academia. ($1,791K)
- (U) Developed technologies and data bases to facilitate timely transition of advanced electronics, optics, and survivability materials to warfighters, industry, and academia. ($1,298K)
- (U) Developed technologies and data bases to facilitate timely transition of advanced materials for improved systems support and operational support to warfighters, industry, and academia. ($688K)

Program Element: #0603112F
PE Title: Advanced Materials for Weapon Systems
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Continue development of technologies and data bases to facilitate timely transition of advanced structures, propulsion, and subsystems materials to warfighters, industry, and academia. ($2,063K)
- (U) Continue development of technologies and data bases to facilitate timely transition of advanced electronics, optics, and survivability materials to warfighters, industry, and academia. ($1,300K)
- (U) Continue development of technologies and data bases to facilitate timely transition of advanced materials for improved systems support and operational support to warfighters, industry, and academia. ($7,483K)

(U) FY 1995 Planned Program:
- (U) Continue development of technologies and data bases to facilitate timely transition of advanced structures, propulsion, and subsystems materials to warfighters, industry, and academia. ($2,452K)
- (U) Continue development of technologies and data bases to facilitate timely transition of advanced electronics, optics, and survivability materials to warfighters, industry, and academia. ($1,734K)
- (U) Continue development of technologies and data bases to facilitate timely transition of advanced materials for improved systems support and operational support to warfighters, industry, and academia. ($1,795K)

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are: General Electric Aircraft Engines, Evendale, OH; University of Dayton, Dayton, OH; Pratt and Whitney Aircraft, West Palm Beach, FL; Texas Instruments, Dallas, TX; and General Research Corp., Santa Barbara, CA.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0603202F, Aerospace Propulsion Subsystem Integration.
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0603216F, Aerospace Propulsion and Power Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603202F
PE Title: Aircraft Propulsion Subsystem Integration (APSI)
Project Number: 668A
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

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

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Aircraft Propulsion Subsystem Integration (APSI)	26,279	27,848	29,941	28,968	30,300	29,507	25,253	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Advanced Development program develops and demonstrates gas turbine propulsion system technologies applicable to a broad range of aircraft. The APSI program has three distinct tasks. Task I develops affordable system component technology such as low pressure fans and low pressure turbines (LPT), engine controls, and nozzles. Task II includes demonstrator engines such as the Joint Technology Demonstrator Engine (JTDE) for manned systems and the Joint Expendable Turbine Engine Concept (JETEC) for cruise missile applications. These demonstrator engines apply the core technology developed under the Advanced Turbine Engine Gas Generator (ATEGG) program. Task III focuses on the system integration aspects of inlets, nozzles, engine/airframe compatibility, and low-observable technologies. This program will provide aircraft with: potential for longer range, higher cruise speed with lower specific fuel consumption; surge power for successful engagements; high sortie rates with reduced maintenance; reduced life cycle cost; and improved survivability resulting in increased mission effectiveness. The APSI program supports the Integrated High Performance Turbine Engine Technology (IHPTET) initiative. IHPTET is a three phase, totally integrated DOD, ARPA, NASA, and industry initiative focused on doubling turbine engine propulsion capabilities while reducing cost of ownership. The IHPTET program structure provides continuous technology transition for military turbine engine upgrades and derivatives and has the added benefit of enhancing the U.S. turbine engine industry's international competitiveness.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Designed, fabricated, and demonstrated fans, low pressure turbines, engine controls, exhaust nozzles, and integration technology for turbofan/turbojet engines for Air Force aircraft. ($5,185K)
   - (U) Designed, fabricated, and tested technology demonstration engines for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. ($16,974K)
   - (U) Designed, fabricated, and tested technology demonstration engines for expendable engines for missile applications. ($4,120K)

Program Element: #0603202F
PE Title: Aircraft Propulsion Subsystem Integration (APSI)
Project Number: 668A
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) Design, fabricate, and demonstrate fans, low pressure turbines, engine controls, exhaust nozzles, and integration technology for turbofan/turbojet engines for Air Force aircraft. ($4,997K)
   - (U) Design, fabricate, and test technology demonstration engines for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. ($18,209K)
   - (U) Design, fabricate, and test technology demonstration engines for expendable engines for missile applications. ($4,642K)

3. (U) FY 1995 Planned Program:
   - (U) Design, fabricate, and demonstrate fans, low pressure turbines, engine controls, exhaust nozzles, and integration technology for turbofan/turbojet engines for Air Force aircraft. ($4,434K)
   - (U) Design, fabricate, and test technology demonstration engines for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. ($21,202K)
   - (U) Design, fabricate, and test technology demonstration engines for expendable engines for missile applications. ($4,305K)

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

D. (U) WORK PERFORMED BY: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The current contractors involved in this program are: Allison Engine Company, Indianapolis, IN; Allied Signal Engines, Phoenix, AZ; General Electric, Evendale, OH; Pratt and Whitney Aircraft, West Palm Beach, FL; Teledyne Ryan Aeronautical-Toledo Operations, Toledo, OH; and Williams International, Walled Lake, MI.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES:
   - (U) PE 0602203F, Aerospace Propulsion.
   - (U) PE 0603112F, Advanced Materials for Weapon Systems.
   - (U) PE 0603216F, Aerospace Propulsion and Power Technology.

Program Element: #0603202F
PE Title: Aircraft Propulsion Subsystem Integration (APSI)
Project Number: 668A
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

- (U) PE 0602122N, Aircraft Technology.
- (U) PE 0603217N, Air Systems Advanced Technology Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

1.	(U) Test propfan core engine required to demonstrate -30% specific fuel consumption (SFC) and -45% in acquisiton costs	May 94
2.	(U) Initiate design/fabrication of nozzle components for turbine engine derivative/upgrades	Jun 94
3.	(U) Complete Integrated High Performance Turbine Engine Technology (IHPTET) Phase I turbofan/turbojet goal demonstration (+30% thrust to weight (T/W), -20% fuel burn (FB))	Sep 94
4.	(U) Complete detailed design of IHPTET Phase II demonstrator for manned systems (overall goals of +60% T/W, -30% FB)	Sep 94
5.	(U) Fabricate hollow metal matrix composite fan blades	Jan 95
6.	(U) Complete fabrication of a reduced signature engine nozzle	Apr 95
7.	(U) Complete fabrication, assemble and test next generation missile demonstrator engine (overall goals of -30% SFC, -45% cost)	Jun 95
8.	(U) Test super cooled turbine components for current fighter engine upgrades and derivatives	Jun 95
9.	(U) Initiate structural assessment testing of an exhaust system technology base for tactical aircraft upgrade/derivatives	Dec 95
10.	(U) Test IHPTET Phase II demonstrator for manned systems (overall goals of +38% T/W, -30% FB)	Apr 96
11.	(U) Complete fabrication, assemble, and test next generation missile demonstrator engine (overall goals of +70% specific thrust, -45% cost)	Jun 96

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
1177 Target Recognition	8,465	3,627	0	0	0	0	0	0*	12,092
2334 Airborne Radar Electronic Counter-Countermeasures	4,585	4,450	0	0	0	0	0	0*	9,035
665A Airborne Sensor Technology	15,037	14,091	16,250	18,500	18,300	17,700	15,200	Cont	TBD
69CK Advanced Electronics	5,797	0	3,785	4,433	4,530	4,292	3,703	Cont	TBD
69DF Target Attack and Recognition Technology	6,262	3,363	14,465	17,369	18,348	17,030	14,763	Cont	TBD
Total	40,146	25,531	34,500	40,302	41,178	39,022	33,666	Cont	TBD

* Project terminated.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program is being conducted to provide advanced technology that will enable continued avionics superiority. Military force structures must contain combat aircraft able to defeat increasingly sophisticated active and passive countermeasures, destroy a wide variety of targets with precision, and reliably perform complex missions with less logistics support in a world of proliferating threats. This program responds to these needs by developing and demonstrating technologies and techniques for advanced radio frequency sensors (i.e., radar) and active and passive electro-optical sensors for airborne and ground targeting, including electronic counter-countermeasures; advanced electronics technologies for improvements in cost, weight, and reliability; and fire control/weapon delivery and target identification and recognition technologies and techniques for precision air and ground target kills. Emphasis is on detecting, locating, and targeting airborne and fixed and mobile time-critical ground threat targets with capability to adapt to changes in target signatures and background environments. These advanced avionics will provide for flexible, multi-function/multi-mission aircraft that can safely penetrate threat areas, destroy multiple ground targets per pass, and perform air combat with positive beyond visual range detection and identification within a complex mix of look-alike friendly, neutral, and enemy aircraft.

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 1177, Target Recognition: Develops and demonstrates avionics technologies and techniques required to achieve positive, high-confidence cueing, recognition, and identification of either airborne or ground-based targets at ranges compatible with tactical air-to-air and air-to-ground weapons, day or night, in adverse-weather, and in high-threat, multiple-target areas.

(U) FY 1993 Accomplishments:
- (U) Developed dynamically adaptable target recognition technologies for radar and electro-optical systems using model-based vision (MBV) approach for targets, background, environment, and sensor. ($3,615K)
- (U) Developed advanced MBV-based target recognition technologies applied to high resolution synthetic aperture radar (SAR) for detecting, identifying, and targeting time-critical surface targets. ($2,100K)
- (U) Developed advanced hostile target identification technologies capable of beyond visual range all-aspect identification and classification of airborne targets. ($2,750K)

(U) FY 1994 Planned Program:
- (U) Develop dynamically adaptable target recognition technologies for radar and electro-optical systems using MBV approach for targets, background, environment, and sensor. ($1,627K)
- (U) Develop advanced MBV-based target recognition technologies applied to high resolution SAR for detecting, identifying, and targeting time-critical surface targets. ($500K)
- (U) Develop advanced hostile target identification technologies capable of beyond visual range all-aspect identification and classification of airborne targets. ($1,500K)

(U) FY 1995 Planned Program: Not Applicable -- Content transferred to Project 69DF.

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Hughes Aircraft, El Segundo, CA; TASC, Reading, MA; TAU Corp., Los Gatos, CA; Martin Marietta, Orlando, FL; and Veda Inc., Dayton, OH.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603742F, Non-Cooperative Target Recognition Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

2. (U) Project 2334, Airborne Radar Electronic Counter-Countermeasures: Develops and demonstrates electronic counter-countermeasure (ECCM) technologies and techniques for current and future airborne weapon system radars that must operate in intense electronic combat environments, with emphasis on methods to reduce radar susceptibilities to enemy electronic countermeasures (ECM).

(U) FY 1993 Accomplishments:
- (U) Developed a radar concept which will exploit advanced microwave and signal processing components to provide a more flexible and adaptive capability to respond to the ECM threat of the future. ($1,875K)
- (U) Developed and flight test demonstrated ECCM techniques to counter user identified air intercept and synthetic aperture radar (SAR) air-to-surface ECM threats to operational radar sensors. ($2,700K)
- (U) Developed simultaneous transmit/receive (T/R) and wide bandwidth technology required for multi-function aperture operation in new and upgraded radar applications. ($10K)

(U) FY 1994 Planned Program:
- (U) Demonstrate a radar concept which will exploit advanced microwave and signal processing components to provide a more flexible and adaptive capability to respond to the ECM threat of the future. ($3,800K)
- (U) Develop and flight test demonstrate ECCM techniques to counter user identified air intercept and SAR air-to-surface ECM threats to operational radar sensors. ($600K)
- (U) Demonstrate simultaneous T/R and wide bandwidth technology required for multi-function aperture operation in new and upgraded radar applications. ($50K)

(U) FY 1995 Planned Program: Not Applicable -- Content transferred to Project 665A.

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Frontier Technologies Inc., Santa Barbara, CA; Adaptive Technologies Inc., Syracuse, NY; Georgia Technical Research Institute, Atlanta, GA; Raytheon, Tewksbury, MA; and Hughes, Los Angeles, CA.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603253F, Advanced Avionics Integration.
- (U) Coordinated with Joint Directorate of Laboratories Sensors and Electronic Warfare Panels.
- (U) This project has been coordinated through the Project Reliance Process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

2. (U) Project 2334, Airborne Radar Electronic Counter-Countermeasures: Develops and demonstrates electronic counter-countermeasure (ECCM) technologies and techniques for current and future airborne weapon system radars that must operate in intense electronic combat environments, with emphasis on methods to reduce radar susceptibilities to enemy electronic countermeasures (ECM).

(U) FY 1993 Accomplishments:
- (U) Developed a radar concept which will exploit advanced microwave and signal processing components to provide a more flexible and adaptive capability to respond to the ECM threat of the future. ($1,875K)
- (U) Developed and flight test demonstrated ECCM techniques to counter user identified air intercept and synthetic aperture radar (SAR) air-to-surface ECM threats to operational radar sensors. ($2,700K)
- (U) Developed simultaneous transmit/receive (T/R) and wide bandwidth technology required for multi-function aperture operation in new and upgraded radar applications. ($10K)

(U) FY 1994 Planned Program:
- (U) Demonstrate a radar concept which will exploit advanced microwave and signal processing components to provide a more flexible and adaptive capability to respond to the ECM threat of the future. ($3,800K)
- (U) Develop and evaluate ECCM techniques to counter user identified air intercept and SAR air-to-surface ECM threats to operational radar sensors. ($600K)
- (U) Demonstrate simultaneous T/R and wide bandwidth technology required for multi-function aperture operation in new and upgraded radar applications. ($50K)

(U) FY 1995 Planned Program: Not Applicable -- Content transferred to Project 665A.

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Frontier Technologies Inc., Santa Barbara, CA; Adaptive Technologies Inc., Syracuse, NY; Georgia Technical Research Institute, Atlanta, GA; Raytheon, Tewksbury, MA; and Hughes, Los Angeles, CA.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603253F, Advanced Avionics Integration.
- (U) Coordinated with Joint Directorate of Laboratories Sensors and Electronic Warfare Panels.
- (U) This project has been coordinated through the Project Reliance Process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles
Project Number: 665A
Budget Activity: #3, Advanced Development
Old Budget Activity. #2, Advanced Technology Development
Date: February 1994

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

Project Title Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Airborne Sensor Technology	15,037	14,091	16,250	18,500	18,300	17,700	15,200	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Develops and demonstrates airborne sensor technologies, including electro-optical (EO) sensors, radars, and electronic counter-countermeasures (ECCM) for radars. The objective of this advanced technology development project is to provide the warfighter with the capability to precisely detect and target both airborne targets and ground-based high-value time-critical targets. Work includes developing both complete sensor capabilities as well as components. The desired warfighting capability includes the ability to detect and target in difficult background conditions, with emphasis on countering improvements in camouflage, concealment, and deception techniques that limit current capability to detect and track threats obscured by these means. Adaptive radar processing and ECCM techniques are developed to transition to operational and new systems and provide for continued sensor performance in the presence of an electromagnetic interference environment that can include both intentional and unintentional clutter and interference. Electro-optical sensors include passive, active, and integrated passive and active technologies. Passive sensors have the advantage of allowing the warfighter to detect, target, and strike, both airborne and ground targets, while remaining covert. Active sensors provide for high confidence target recognition capability at long range and also provide for a wind sensing capability. Long range target recognition will give our warfighters the operational advantage. Wind sensing enables precision weapon deployment and air cargo drop. The synergistic integration of these technologies will provide operational users with the capability for an electro-optical target engagement system that will maintain the combat advantage.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Developed advanced EO sensors for air-to-ground reconnaissance and targeting in adverse-weather with improved countermeasure immunity against concealed and camouflaged targets. ($1,053K)
   - (U) Developed advanced air-to-air EO sensors for target detection and tracking in high clutter environments with interface for real-time automated target recognition processing and enhanced situational displays. ($13,233K)
   - (U) Developed laser radar technologies to provide for a wind profiling capability for precision first shot and air drop. Laser radar technologies will also be developed to provide a capability to detect, target, and identify high-value ground-based time-critical targets. ($751K)

2. (U) FY 1994 Planned Program:
   - (U) Fabricate and evaluate infrared window capable of operating in a supersonic cruise environment. ($11,836K)

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles

Project Number: 665A
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) Develop advanced air-to-ground electro-optical (EO) sensors for target detection and tracking in high clutter environments with interface for real-time automated target recognition processing. ($282K)
- (U) Demonstrate laser radar technologies to provide for a wind profiling capability for precision first shot and air drop. Laser radar technologies will also be developed to provide a capability to detect, target, and identify high-value ground-based time-critical targets. ($1,973K)

3. (U) FY 1995 Planned Program:
   - (U) Develop and demonstrate radar electronic counter-countermeasure (ECCM) techniques to provide for a capability to negate air intercept and synthetic aperture radar (SAR) (for air-to-surface) electronic countermeasure (ECM) threats. Perform evaluation of operational sensors susceptibility to validate ECM threats. ($4,350K)
   - (U) Demonstrate laser radar technologies to provide for a wind profiling capability for precision first shot and air drop. Laser radar technologies will also be developed to provide a capability to detect, target, and identify high-value ground-based time-critical targets. ($2,093K)
   - (U) Demonstrate integrated active and passive EO sensors to provide for a capability for ground reconnaissance and targeting of time-critical targets. ($892K)
   - (U) Demonstrate adaptive processing techniques to provide for a capability to negate clutter and electromagnetic interference, both intentional and intentional, for uninterrupted sensor performance and for increased detection and targeting performance against sophisticated and low radar cross section targets. ($250K)
   - (U) Develop and demonstrate, through a multi-Service program, the sensor and algorithm technology required to detect, identify, and target high-value time-critical targets obscured by foliage or concealed through deceptive techniques. ($8,050K)
   - (U) Demonstrate, through a multi-Service program, the radar sensor technology required for a two-dimensional image of airborne high value threats. This technology will aid in real-time, high-confidence target identification. ($310K)
   - (U) Demonstrate critical technology components required to achieve a low-cost radar system architecture with improved weapon system life cycle cost. ($105K)
   - (U) Develop advanced air-to-air EO sensor technology for target detection and tracking in high clutter environments with interface for real-time automated target recognition processing and enhanced situation displays. ($200K)

4. (U) Program To Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Hughes Aircraft, El Segundo, CA; Boeing, Wichita, KS; McDonnell Douglas, St. Louis, MO; EOIR Measurements, Spotsylvania, VA; and Martin Marietta, Orlando, FL.

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles
Project Number: 665A
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: This project has been restructured in FY 1995 to include all airborne sensor advanced technology development. Project 2334 from this Program Element (PE) and Project 2733 from PE 0603253F were incorporated. The resulting single Air Force Science and Technology sensor Advanced Development project consolidates resources for this critical technical area.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: Project 2334 planned funding was consolidated in this project beginning in FY 1995.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) PE 0603253F, Advanced Avionics Integration.
- (U) Coordinated with Joint Directorate of Laboratories Sensors Panel.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

1.	(U) Wind profiler ground demonstration	Jul 94
2.	(U) Complete wind sensor fabrication	Sep 94
3.	(U) Complete infrared window risk reduction experiment	Sep 94
4.	(U) Complete electronic counter-countermeasure techniques development for operational sensors to counter validated electronic countermeasure threats	Sep 94
5.	(U) Wind sensor flight test	Mar 95
6.	(U) Complete integrated active/passive sensor preliminary design	Apr 95
7.	(U) Complete design of low frequency synthetic aperture radar	Sep 95
8.	(U) Complete infrared window laboratory test	Sep 95
9.	(U) Complete multi-spectral sensor design	Dec 95

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles
Project Number: 69DF
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

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

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Target Attack and Recognition Technology	6,262	3,363	14,465	17,369	18,348	17,030	14,763	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Develops and demonstrates advanced technologies to provide for attack management, fire control, and target identification and recognition capabilities. The objective of this Advanced Development project includes developing and demonstrating integrated fire control techniques to provide for a capability of adverse-weather air-to-surface precision strike against multiple targets-per-pass and air-to-air engagement at maximum weapon launch range with cooperative launch deployment flexibility. Specific fire control technologies include attack management, sensor fusion, automated decision aids, advanced tracking for low radar cross section threats, and targeting using both on-board and off-board sensor information. These fire control developments will provide force multiplication and a reduction of exposure to hostile fire. The objective of this project also includes developing and demonstrating technologies to provide for positive, high confidence cueing, recognition, and identification of both airborne and ground-based high-value time-critical targets at ranges compatible with tactical air-to-air and air-to-surface weapons in bad weather, day or night, and in high-threat multiple target battle areas. Model-based vision algorithms and target signature development techniques are key to the identification and recognition solution and are pursed in this project. The fire control and recognition technologies developed and demonstrated in this project are high leverage in that they provide for significant advancements in operational capabilities largely through software improvements which can be readily transitioned to new and existing systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Developed advanced air-to-air engagement and weapon delivery technologies for defeat of sophisticated and reduced observable threats. ($4,975K)
   - (U) Developed advanced air-to-surface tracking, fire control, and weapon delivery technologies for precision attack of multiple targets in a single pass from an aircraft maneuvering to survive complex threats. ($850K)
   - (U) Developed advanced cooperative engagement methods, decision aids, and intra-flight mission management to improve combat performance in demanding missions. ($637K)

2. (U) FY 1994 Planned Program:
   - (U) Demonstrate advanced air-to-air engagement and weapon delivery technologies for defeat of sophisticated and reduced observable threats. ($1,525K)
   - (U) Demonstrate advanced air-to-surface tracking, fire control, and weapon delivery technologies for precision attack of multiple targets in a single pass from an aircraft maneuvering to survive complex threats. ($1,748K)

Program Element: #0603203F
PE Title: Advanced Avionics for Aerospace Vehicles
Project Number: 69DF
Budget Activity: #3, Advanced Development
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Date: February 1994

- (U) Demonstrate advanced cooperative engagement methods, decision aids, and intra-flight mission management to improve combat performance in demanding missions. ($90K)

3. (U) FY 1995 Planned Program:
   - (U) Demonstrate dynamically adaptable target recognition technologies and algorithms for radar and electro-optical systems using model-based vision (MBV) approach for targets, background, environment, and sensor to provide the pilot a capability for improved target detection and recognition. ($5,465K)
   - (U) Demonstrate advanced hostile target identification technologies to provide for a capability for beyond visual range all-aspect, high confidence classification and identification of airborne targets. ($1,500K)
   - (U) Demonstrate advanced air-to-air engagement and weapon delivery technologies to provide for a capability for beyond visual range detection, targeting, and weapon deployment against sophisticated and reduced observable airborne threats. ($2,000K)
   - (U) Demonstrate innovative air-to-surface detection, tracking, fire control and weapon integration and delivery technologies to provide the warfighter a capability for real-time precision targeting, automated multiple weapon release on a single pass, and precision strike capability while maneuvering to survive in a complex ground-based threat environment. ($5,500K)

4. (U) Program To Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: McDonnell Douglas, St. Louis, MO; Boeing, Wichita, KS; Lockheed, Fort Worth, TX; Hughes Aircraft Division, Los Angeles, CA; and Westinghouse, Baltimore, MD.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: This project has been restructured in FY 1995 to include all target attack and recognition advanced technology development. Project 1177 from this Program Element was incorporated. The resulting single Air Force Science and Technology target attack and recognition advanced technology development project consolidates resources for this critical, high leverage technical area.

2. (U) SCHEDULE CHANGES: None.

3. (U) COST CHANGES: The funding from Project 1177 was consolidated in this project beginning in FY 1995.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

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G. (U) RELATED ACTIVITIES:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603742F, Non-Cooperative Target Recognition Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

1.	(U) Advanced tracking demonstration	Sep 94
2.	(U) Demonstrate hostile target identification algorithm for transition	Sep 94
3.	(U) Multiple weapon delivery man-in-the loop demonstration	Mar 95
4.	(U) Compete design for cooperative launch techniques	Sep 95
5.	(U) Demonstrate synthetic target signature generation	Jan 96
6.	(U) Demonstrate cooperative launch feasibility evaluation	Mar 96

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603205F
PE Title: Flight Vehicle Component and Subsystem Technologies
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2506 Control of Flight	4,497	3,415	4,265	100	0	0	0	Cont	TBD
2508 Aeromechanics/Vehicle Subsystems	2,331	1,611	846	5,952	9,912	11,616	10,452	Cont	TBD
2978 Reliability and Maintainability	3,492	3,973	6,561	7,029	5,685	1,000	1,100	Cont	TBD
3422 Cockpit Technology	4,953	4,042	2,667	1,280	200	100	1,500	Cont	TBD
Total	15,273	13,041	14,339	14,361	15,797	12,716	13,052	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops and demonstrates advanced vehicle subsystems, flight control, cockpit, and aerodynamic technologies for technology transition and user evaluation. Develops and demonstrates advanced hydraulic- and electrically-powered control actuators and brake systems (e.g. more electric aircraft). Demonstrates integrated aircraft utility subsystems that reduce aircraft part count, improve aircraft reliability and maintainability (R&M), and increase performance and survivability of existing systems. Demonstrates advanced cockpit technologies for improved utilization of on- and off-board information, improved crew memeber performance, and reduced crew size.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 2506, Control of Flight: Develops flight control technologies, including integration of flight/propulsion control and vehicle management system technologies, for improved total aircraft efficiency, performance, and maneuverability. Develops electrically powered control surface actuator and brake systems to eliminate centralized hydraulic systems and associated maintenance/safety problems. Develops "smart" actuators that utilize embedded sensors and computer actuation to enhance performance (e.g., compensate for battle damage). Develops integration technologies to reduce the number of individual control and subsystems boxes in an aircraft by combining electrical, environmental, hydraulic, oxygen-generating, and other utility functions.

Program Element: #0603205F
PE Title: Flight Vehicle Component and Subsystem Technologies
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate advanced flight control concepts to provide a combat advantage for 21st century aircraft by increasing performance and survivability while decreasing cost and supportability requirements. ($2,603K)
- (U) Continued to develop and demonstrate technologies for integrated, multi-function aircraft utility (e.g., electrical, environmental control, subsystem management) components. ($1,894K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate advanced flight control concepts to provide a combat advantage for 21st century aircraft by increasing performance and survivability while decreasing cost and supportability requirements. ($1,977K)
- (U) Develop and demonstrate technologies for integrated, multi-function aircraft utility (e.g., electrical, environmental control, subsystem management) components. ($1,438K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate advanced flight control concepts to provide a combat advantage for 21st century aircraft by increasing performance and survivability while decreasing cost and supportability requirements. ($2,469K)
- (U) Develop and demonstrate technologies for integrated, multi-function aircraft utility (e.g., electrical, environmental control, subsystem management) components. ($1,796K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright Patterson AFB, OH. The major contractors are: McDonnell Douglas Aircraft Co., St. Louis, MO; Lockheed, Ft. Worth; TX; Martin Marietta, Binghamton, NY; MPC, Skokie IL; and Lear Siegler, Dayton, OH.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603216F, Aerospace Propulsion and Power.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2508, Aeromechanics/Vehicle Subsystems: Develops aerodynamic technology and subsystems for improved aircraft maneuverability, agility, reliability, and performance at a lower cost. Develops and demonstrates aerodynamic technologies for safe high angle-of-attack (AOA) operation. Develops aerodynamic and propulsion control devices for improved air vehicle flight maneuvers and reduced fighter aircraft vertical tails. Develops low-drag/low-observable, external weapon carriage concepts for incorporating air-to-surface

Program Element: #0603205F
PE Title: Flight Vehicle Component and Subsystem Technologies
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

weapons on fighter aircraft. Develops advanced environmental control system concepts for cockpit/avionics cooling and increased range by reducing the engine bleed air requirement. Integrates aeromechanical crew escape technologies for full mission crew escape capability.

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate aerodynamic subsystem/component technologies for improved maneuverability and performance. ($1,321K)
- (U) Continued to develop and demonstrate subsystem/component technologies for improved crew escape capabilities. ($1,010K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate aerodynamic subsystem/component technologies for improved maneuverability and performance. ($913K)
- (U) Develop and demonstrate subsystem/component technologies for improved crew escape capabilities. ($698K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate aerodynamic subsystem/component technologies for improved maneuverability and performance. ($479K)
- (U) Develop and demonstrate subsystem/component technologies for improved crew escape capabilities. ($367K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright Patterson AFB, OH. The major contractors are: Boeing Corp., Seattle, WA; McDonnell Douglas Aircraft Co., St. Louis, MO; Grumman Aerospace Corp., Bethpage, NY; Canadian Commercial Corp., Ontario, Canada; and Calspan, Mountain View, CA.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0602602F, Conventional Weapons Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) *This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.*

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603205F
PE Title: Flight Vehicle Component and Subsystem Technologies
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

3. (U) Project 2978, Reliability and Maintainability: Designs and develops air vehicle technologies for improved reliability, maintainability, and supportability while increasing performance, survivability, and mission effectiveness. Develops software modules to validate and verify critical flight control software. Develops tire analysis, design, and testing technology to significantly improve tire life, thus, lowering life cycle costs for existing and future aircraft. Develops design and assessment concepts to reduce the high failure rate of electromechanical aircraft subsystems. Develops a knowledge-based engineering model to predict life cycle elements of aircraft and subsystems.

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate technologies that reduce logistics support (e.g., reduce the volume, weight, and cost of spares deployed, or improve reliability, availability, and maintainability). ($1,455K)
- (U) Continued to develop and demonstrate technologies that increase air vehicle survivability and safety. ($2,037K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate technologies that reduce logistics support (e.g., reduce the volume, weight, and cost of spares deployed, or improve reliability, availability, and maintainability). ($1,656K)
- (U) Develop and demonstrate technologies that increase air vehicle survivability and safety. ($2,317K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate technologies that reduce logistics support (e.g., reduce the volume, weight, and cost of spares deployed, or improve reliability, availability, and maintainability). ($2,734K)
- (U) Develop and demonstrate technologies that increase air vehicle survivability and safety. ($3,827K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright Patterson AFB, OH. The major contractors are: McDonnell Douglas Aircraft Co., St. Louis, MO; Lockheed, Ft. Worth; TX, Hughes, Tucson, AZ; SAIC, Philadelphia, PA; and BF Goodrich, Akron, OH.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603216F, Aerospace Propulsion and Power.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 3422, Cockpit Technology: Develops and assesses cockpit advanced development concepts. Integrates flat panel displays with graphic processors, applies heads-up and helmet-mounted displays where appropriate, and standardizes display symbology. Applies

Program Element: #0603205F
PE Title: Flight Vehicle Component and Subsystem Technologies
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

artificial intelligence technology, three-dimensional audio, voice command, and other cockpit technologies to facilitate attack of fixed and mobile targets at night and in adverse-weather. Develops methods for presenting shared, real-time intelligence information. Develops and assesses advanced cockpit technologies for tactical transport aircraft. Improves situational awareness and crew member productivity during night/adverse-weather, low-level operations.

(U) FY 1993 Accomplishments:
- (U) Continued to evaluate high-payoff methods for integrating, presenting, and sharing on- and off-board real-time intelligence data in the cockpit. ($3,715K)
- (U) Continued to develop and demonstrate, for user evaluation, advanced technologies and techniques to improve crewmember productivity during night, adverse-weather, low level, and/or combat operations. ($1,238K)

(U) FY 1994 Planned Program:
- (U) Evaluate high-payoff methods for integrating, presenting, and sharing on- and off-board real-time intelligence data in the cockpit. ($3,032K)
- (U) Develop and demonstrate, for user evaluation, advanced technologies and techniques to improve crew member productivity during night, adverse-weather, low level, and/or combat operations. ($1,010K)

(U) FY 1995 Planned Program:
- (U) Evaluate high-payoff methods for integrating, presenting, and sharing on- and off-board real-time intelligence data in the cockpit. ($2,001K)
- (U) Develop and demonstrate, for user evaluation, advanced technologies and techniques to improve crew member productivity during night, adverse-weather, low level, and/or combat operations. ($666K)

(U) Work Performed By: This project is managed by the Wright Laboratory, Wright Patterson AFB, OH. The major contractors are: Lockheed, Ft. Worth, TX; Honeywell, Minneapolis, MN; VEDA, Arlington, VA; Lear Siegler, Dayton, OH; and Midwest System Research, Dayton OH.

(U) Related Activities:
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603253F, Advanced Avionics Integration.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603211F
PE Title: Aerospace Structures
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
486U Advanced Metallics	7,697	6,124	6,396	6,942	6,704	6,453	5,523	Cont	TBD
69CW Advanced Composites	8,210	6,447	5,904	6,393	6,188	5,956	5,099	Cont	TBD
Total	15,907	12,571	12,300	13,335	12,892	12,409	10,622	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program in aircraft structures develops both metals and composites technologies to reduce the cost of airframe ownership through innovative structural concepts established through concurrent engineering and integrated product development approaches. This program demonstrates advanced structural design concepts using nonmetallic and metallic structures. Innovative structural concepts integrate these two types of materials with new design, manufacturing, and test techniques. The goal of this program is to transition these technology benefits to all types of flight vehicle structures, ranging from airframes to canopies to engines. The results are lighter, stronger, less maintenance intensive, more durable structures for current and future aerospace systems. This yields lower cost of ownership (by reducing acquisition, support, and maintenance costs), increased range (less structural weight means more fuel can be carried), improved sortie rates (due to durability and damage/threat tolerance and design for supportability), and reduced observability (both radar cross section and infrared).

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 486U, Advanced Metallics: This project demonstrates new metallic structures technology using metal matrix composites (MMC), rapidly solidified metal powders, advanced aluminum and titanium alloys, and advanced damping materials. These are used to develop innovative design concepts which could transition to fielded and future military and civilian flight vehicle structures to yield lower weight, greater reliability, improved survivability (ballistic/laser damage, bird strikes, etc.), supportability, and affordability.

(U) FY 1993 Accomplishments:
- (U) Continued to demonstrate advanced metallic structural concepts and design techniques for future air vehicles. ($4,274K)
- (U) Continued to demonstrate advanced metallic materials, structures, and repair techniques to enhance the structural life of existing aircraft. ($3,423K)

Program Element: #0603211F
PE Title: Aerospace Structures
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Demonstrate advanced metallic structural concepts and design techniques for future air vehicles. ($3,496K)
- (U) Demonstrate advanced metallic materials, structures, and repair techniques to enhance the structural life of existing aircraft. ($2,628K)

(U) FY 1995 Planned Program:
- (U) Demonstrate advanced metallic structural concepts and design techniques for future air vehicles. ($3,745K)
- (U) Demonstrate advanced metallic materials, structures, and repair techniques to enhance the structural life of existing aircraft. ($2,651M)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Lockheed Aeronautical Systems Co., Marietta, GA; Northrop Corp., Hawthorne, CA; General Dynamics (Lockheed), Ft. Worth, TX; Boeing Aerospace Co., Kent, WA; and McDonnell Douglas Co, St Louis, MO.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603112F, Advanced Materials for Weapon Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 69CW, Advanced Composites: Demonstrates advanced nonmetallic structures technology using fiber reinforced thermoset, thermoplastic, carbon-carbon, and ceramic materials. These technologies provide enhanced survivability (reduced radar and infrared signature, increased damage tolerance), reduced weight, reduced acquisition and life cycle costs, and increased mission readiness for weapon systems.

(U) FY 1993 Accomplishments:
- (U) Continued to demonstrate advanced composite structural concepts and design techniques for future air vehicles. ($6,125K)
- (U) Continued to demonstrate advanced composite materials, structures, and repair techniques to enhance the structural life of existing aircraft. ($2,025K)

Program Element: #0603211F
PE Title: Aerospace Structures
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Demonstrate advanced composite structural concepts and design techniques for future air vehicles. ($4,557K)
- (U) Demonstrate advanced composite materials, structures, and repair techniques to enhance the structural life of existing aircraft. ($1,890K)

(U) FY 1995 Planned Program:
- (U) Demonstrate advanced composite structural concepts and design techniques for future air vehicles. ($4,064K)
- (U) Demonstrate advanced composite materials, structures, and repair techniques to enhance the structural life of existing aircraft. ($1,840)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Lockheed Aeronautical Systems Co., Marietta, GA; Northrop Corp., Hawthorne, CA; General Dynamics (Lockheed), Ft. Worth, TX; Boeing Aerospace Co., Kent, WA; and McDonnell Douglas Co., St. Louis, MO.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603112F, Advanced Materials for Weapon Systems.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Numbers & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2480 Aerospace Fuels Technology	1,025	1,274	1,950	2,270	1,560	1,585	1,333	Cont	TBD
2697 Atmospheric Propulsion Concepts	6,320	3,425	4,914	4,743	1,785	1,812	1,524	Cont	TBD
3035 Aerospace Power Technology	2,424	2,081	3,327	4,228	5,313	6,242	4,779	Cont	TBD
3036 Battery Technology*	826	480	0	0	0	0	0	Cont	TBD
681B Advanced Turbine Engine Gas Generator (ATEGG)	26,553	29,150	30,471	28,753	31,765	31,707	26,222	Cont	TBD
Total	37,148	36,410	40,662	39,994	40,423	41,346	33,858	Cont	TBD

*Project terminated and efforts transferred into Project 3035, Aerospace Power Technology.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program ensures continuous development and demonstration of affordable turbine engine high pressure core components, advanced airbreathing engine concepts, high heat sink and thermally stable fuels, and power technology for aerospace vehicles. Anticipated technology advances include: turbine engine improvements providing a 33% reduction in aircraft takeoff gross weight for tactical fighter aircraft and a 100% increase in aircraft range/loiter; ducted rocket improvements that increase missile average and terminal velocity by 50% for enhanced lethality; higher temperature fuels for propulsion and thermal management; an aircraft battery with a 20-year maintenance-free life expectancy; and electric aircraft power components projected to have a two- to five-fold improvement in reliability and maintainability, a 20% reduction in power system weight, and enhanced survivability.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2480, Aerospace Fuels Technology: Demonstrates new thermally stable (JP) and endothermic fuels and fuel system components that minimize cost, reduce maintenance, and improve performance of aircraft and missile engines. Conventional petroleum and alternate fuels are demonstrated for both aircraft and missiles. Emphasis is on demonstrating thermally stable fuels that will reduce fuel system maintenance problems in current aircraft and provide 50% more cooling capability for upgraded weapon systems with very little increase in fuel cost.

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

Endothermic fuel heat exchangers/reactors will be demonstrated to provide maximum cooling capability for aircraft avionics and infrared signature reduction.

(U) FY 1993 Accomplishments:
- (U) Demonstrated endothermic fuel capability (15 times more cooling capacity than JP-8) from JP-7 in a wall-cooled combustor/nozzle reactor sector. ($565K)
- (U) Continued development of high thermal stability fuels to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is necessary for current and future aircraft to reduce fuel systems fouling and provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($300K)
- (U) Continued development of high temperature fuel systems to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is necessary for current and future aircraft to provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($160K)

(U) FY 1994 Planned Program:
- (U) Develop high thermal stability and endothermic hydrocarbon fuels to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is necessary for current and future aircraft to reduce fuel systems fouling and provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($1,020K)
- (U) Develop high temperature fuel systems to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is necessary for current and future aircraft to provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($254K)

(U) FY 1995 Planned Program:
- (U) Develop high thermal stability and endothermic hydrocarbon fuels to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is necessary for current and future aircraft to reduce fuel systems fouling and provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($1,602K)
- (U) Develop high temperature fuel systems to provide higher heat capacity and operating temperatures for aircraft and missile systems. This technology is necessary for current and future aircraft to provide cooling for increased avionics loads, higher engine temperatures, and reduced fuel consumption. ($348K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The two contractors are: Pratt and Whitney, West Palm Beach, FL; and Lockheed, Ft. Worth, TX.

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) Related Activities:
- (U) PE 0602203F, Aerospace Propulsion.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriated Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2697, Atmospheric Propulsion Concepts: Demonstrates unconventional airbreathing propulsion subsystems such as ramjets, air turborockets, and combined cycle engines to assure future propulsion options for high-speed missiles. Currently, the Variable Flow Ducted Rocket (VFDR) concept is being developed as an improved propulsion system for current missile upgrades or future missile systems developments.

(U) FY 1993 Accomplishments:
- (U) Demonstrated sustainer performance and durability at maximum fuel flow and at most thermally stressing conditions. ($1,500K)
- (U) Demonstrated ramjet autoignition and operation at Mach 2, polar day, low altitude simulated conditions. ($500K)
- (U) Continued development of VFDR for airbreathing missile applications. This effort facilitates technology transition to current and future tactical missiles with longer range, higher velocities, and increased maneuverability, increasing overall missile effectiveness. ($4,320K)

(U) FY 1994 Planned Program:
- (U) Continue development of VFDR for airbreathing missile applications. This effort facilitates technology transition to current and future tactical missiles with longer range, higher velocities, and increased maneuverability, increasing overall missile effectiveness. ($3,225K)
- (U) Plan development of supersonic combustion ramjets for unmanned applications. This effort enables technology transition for future missile systems where time-to-target is critical. ($100K)
- (U) Plan development of turborocket and air-core enhanced turborocket engines for high-speed manned and unmanned systems. This effort supports technology transition for next generation reconnaisance/strike vehicles and airbreathing boosters. ($100K)

(U) FY 1995 Planned Program:
- (U) Continue development of VFDR for airbreathing missile applications. This effort facilitates technology transition to current and future tactical missiles with longer range, higher velocities, and increased maneuverability, increasing overall missile effectiveness. ($4,514K)

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology
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Date: February 1994

- (U) Develop supersonic combustion ramjets for unmanned applications. This effort enables technology transition for future missile systems where time-to-target is critical. ($200K)
- (U) Develop turborocket and air-core enhanced turborocket engines for high-speed manned and unmanned systems. This effort supports technology transition for next generation reconnaisance/strike vehicles and airbreathing boosters. ($200K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The three contractors are: Atlantic Research Corporation, Gainesville, VA; Hercules Inc., McGregor, TX; and Hughes Missile Systems Corp., Canoga Park, CA.

(U) Related Activities:
- (U) PE 0602203F, Aerospace Propulsion.
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3035, Aerospace Power Technology: Develops and demonstrates aircraft power systems including engine starters, auxiliary power units, and electrical power distribution systems. The principal focus is the More Electric Aircraft (MEA) initiative providing a two- to five-fold improvement in reliability and maintainability and significantly reduced cost of ownership for aircraft power systems. This will be accomplished by replacing fluid-powered (hydraulics/bleed air) accessories with electrically-powered systems. Representative improvements quantified for MEA include: increased reliability (8-18%); improved maintainability (9-12%); and reduced vulnerability (12-14%).

(U) FY 1993 Accomplishments:
- (U) Sucessfully demonstrated transition of power converter system utilizing resonant link topology and sucessfully integrated breadboard design for the high reliability generator into flange cylindrical geometry. ($600K)
- (U) Designed, fabricated, and tested selected portions of a demonstrator aircraft distribution system. The electrical distribution system ensures fault tolerant architecture, improving aircraft reliability and survivability. ($1,097K)
- (U) Designed, fabricated, and tested a demonstrator aircraft electrical generator/motor subsystem. The electrical generator/motor subsystem is critical for aircraft engine starting, auxilliary power, and emergency power. ($727K)

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Design, fabricate, and test components supporting a demonstrator aircraft distribution system. The electrical distribution system ensures fault tolerant architecture, improving aircraft reliability and survivability. ($1,331K)
- (U) Design, fabricate, and test a demonstrator aircraft electrical generator/motor subsystem. The electrical generator/motor subsystem is critical for aircraft engine starting, auxilliary power, and emergency power. ($750K)

(U) FY 1995 Planned Program:
- (U) Design, fabricate, and test components supporting a demonstrator aircraft electrical distribution system. The electrical distribution system ensures fault tolerant architecture, improving aircraft reliability and survivability. ($2,115K)
- (U) Design, fabricate, and test a demonstrator aircraft electrical generator/motor subsystem. The electrical generator/motor subsystem is critical for aircraft engine starting, auxilliary power, and emergency power. ($907K)
- (U) Design, fabricate, and test a demonstrator aircraft advanced battery system. The advanced battery system will provide 20-year life for aircraft batteries, greatly reducing maintenance requirements, environmental problems of disposal, and life cycle costs. ($305K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The three contractors are: Allied Signal, Phoenix, AZ, Torrance, CA, and Eatontown, NJ; General Electric, Schenectady, NY, and Evendale, OH; and Northrop Corporation, Hawthorne, CA.

(U) Related Activities:
- (U) PE 0602203F, Aerospace Propulsion.
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 3036, Battery Technology: Develops and demonstrates advanced battery technology for aircraft and missiles to provide higher energy density (more energy per volume) with improved life. A major focus is the development of a nickel-cadmium aircraft battery with a 20-year maintenance-free life expectancy. Current nickel-cadmium aircraft batteries require scheduled maintenance every 30-90 days. This "maintenance-free" technology will eliminate the need for flight line battery shops and overall Air Force fleet savings could approach one billion dollars for a 20-year time period from decreased life cycle and maintenance costs.

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed fabrication of sealed nickel-cadmium battery system and flight tested on E-3 Airborne Warning and Control System (AWACS) aircraft. ($590K)
- (U) Battery charger electronics upgraded to include built-in-test and charge/discharge functions, and to maintain full battery charge status leading to a maintenance-free battery. ($236K)

(U) FY 1994 Planned Program:
- (U) Complete charger packaging and qualification testing of a flight ready battery charger. ($243K)
- (U) Integrate battery and charger systems and check circuit logic and communications. ($95K)
- (U) Perform full range of battery/charger system testing including life cycle, temperature cycling, vibration, and electromagnetic interference. ($142K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The two contractors are: Eagle-Picher, Joplin, MO; and Eldec, Lynnwood, WA.

(U) Related Activities:
- (U) PE 0602203F, Aerospace Propulsion.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology
Project Number: 681B
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

A (U) RESOURCES ($ in Thousands):

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Advanced Turbine Engine Gas Generator (ATEGG)	26,553	29,150	30,471	28,753	31,765	31,707	26,222	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Advanced Development project develops turbine engine gas generator technology to meet the requirements of current and future aircraft propulsion systems. The objective is to provide the continued evolution of technologies into an advanced gas generator in which the performance, cost, durability, repairability, and maintainability aspects can be assessed in a real engine environment. The gas generator, or core, is the basic building block of the engine and it consists of a compressor, a combustor, and a high pressure turbine. Experimental core engine testing enhances early, low-risk transition of key engine technologies into engineering development where they can be applied to derivative and/or new systems. These technologies are applicable to a wide range of military and commercial systems including aircraft, missiles, land combat vehicles, and ships. The ATEGG project supports the Integrated High Performance Turbine Engine Technology (IHPTET) initiative. IHPTET is a three phase, totally integrated DOD, ARPA, NASA, and industry initiative focused on doubling turbine engine propulsion capabilities while reducing cost of ownership. The IHPTET program structure provides continuous technology transition for military turbine engine upgrades and derivatives and has the added benefit of enhancing the U.S. turbine engine industry's international competitiveness.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Designed, fabricated, and tested technology demonstration core engines for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. ($26,146K)
   - (U) Designed and fabricated technology demonstration core engines for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, and theater transports. ($407K)

2. (U) FY 1994 Planned Program:
   - (U) Design fabricate, and test technology demonstration core engines for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. ($28,980K)
   - (U) Design, fabricate, and test technology demonstration core engines for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, and theater transports. ($170K)

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology
Project Number: 681B
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

3. (U) FY 1995 Planned Program:
   - (U) Design fabricate, and test technology demonstration core engines for turbofan/turbojet engines for fighters, attack aircraft, bombers, and transports. ($28,991K)
   - (U) Design, fabricate, and test technology demonstration core engines for turboshaft/turboprop and small turbofan engines for trainers, rotorcraft, special operations aircraft, and theater transports. ($1,480K)

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

D. (U) WORK PERFORMED BY: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: General Electric, Evendale, OH; Pratt and Whitney, West Palm Beach, FL; Allied Signal Engines, Phoenix, AZ; Allison Engine Company, Indianapolis, IN; and Textron Lycoming, Stratford, CT.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: Turboshaft/turboprop core testing planned for late FY 1993 now planned for early FY 1994. Turbine blade failure during initial core engine testing required a new casting to accomplish sub-component refurbishment.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION: None.

G. (U) RELATED ACTIVITIES:
   - (U) PE 0602203F, Aerospace Propulsion.
   - (U) PE 0603202F, Aircraft Propulsion Subsystem Integration.
   - (U) PE 0602122N, Aircraft Technology.
   - (U) PE 0603210N, Aircraft Propulsion
   - (U) PE 0603003A, Aviation Advanced Technology.
   - (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

Program Element: #0603216F
PE Title: Aerospace Propulsion and Power Technology

Project Number: 681B
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

J. (U) MILESTONE SCHEDULE:

1.	(U) Initiate testing of next generation turboshaft/turboprop core	Apr 94
2.	(U) Conduct testing of next generation turbofan/turbojet core with low emissions combustor and high work turbine	Sep 94
3.	(U) Conduct testing of next generation turboshaft/turboprop core (+60% power-to-weight, -25% fuel consumption)	Feb 95
4.	(U) Conduct testing of turbofan/turbojet core with transpiration cooled combustor and turbine at +600°F	Apr 95
5.	(U) Conduct steady state durability testing of advanced turbofan/turbojet core (50 hours maximum temperature)	Sep 95
6.	(U) Conduct turbofan/turbojet core cyclic durability testing (2000 cycles)	Sep 96
7.	(U) Conduct testing of turboshaft/turboprop core (+80% power-to-weight, -30% fuel consumption)	Sep 96

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603227F
PE Title: Personnel, Training, and Simulation Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2743 Combat Aircrew Training Technology	5,097	5,324	5,328	5,294	5,106	5,238	4,391	Cont	TBD
2922 Manpower and Force Management	1,336	1,488	1,642	1,640	1,622	1,630	1,641	Cont	TBD
2949 Advanced Training Technology	2,535	1,957	2,271	2,040	2,005	2,011	1,976	Cont	TBD
Total	8,968	8,769	9,241	8,974	8,733	8,879	8,008	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops and demonstrates improved operational readiness and combat training through Manpower, Personnel, and Training (MPT) technologies which include: systems to write computer-based training programs; decision-aiding systems to optimize personnel use; job performance measurement technologies; analytical tools to better consider MPT in systems design; and realistic aircrew combat training.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2743, Combat Aircrew Training Technology: This project develops, demonstrates, and evaluates simulator-based air combat training as an affordable, effective, and realistic adjunct to flight-based training. Provides a testbed for examining aircrew skills, cognitive functions, behaviors, and instructional strategies contributing to combat success. Evaluates technologies for long-distance computer networking to enhance current methods for joint-Service training. This program will improve unit level training, develop simulation-enabling technologies, provide bare base simulator technology, define forward deployed simulator usage and training methods for combat deployment, demonstrate and refine sustainability and concurrence practices, lower life cycle costs, and transition dual-use demonstrators. The program will also explore methods for providing aircrews with portable, high-fidelity methods for learning Night Vision Device skills.

(U) FY 1993 Accomplishments:
- (U) Demonstrated fully integrated multi-ship training simulator technology. ($2,900K)
- (U) Developed network with hunt-and-kill mobile missile launcher simulation. ($430K)
- (U) Developed standards for multi-ship simulators working interactively on a distributed network. ($407K)

Program Element: #0603227F
PE Title: Personnel, Training, and Simulation Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) Demonstrated a lightweight deployable aircraft simulator technology that is affordable and can be placed in each squadron level organization. ($1,360K)

(U) FY 1994 Planned Program:
- (U) Develop multi-Service distributed training testbed for long-distance networks. ($1,200K)
- (U) Demonstrate four-ship formation training simulator technology in an integrated threat environment. ($2,200K)
- (U) Develop technology for control and debrief viewing stations for mission rehearsal. ($1,500K)
- (U) Develop distance estimation training technology for night vision goggles. ($424K)

(U) FY 1995 Planned Program:
- (U) Develop technology for multi-ship networking of aircrew ground training. ($1,288K)
- (U) Develop low-cost mosaic/hybrid display technology for improved visual display. ($1,350K)
- (U) Develop technology for multi-task trainers. ($1,100K)
- (U) Develop combat situational awareness technology. ($760K)
- (U) Develop advanced technology for interactive night vision device training. ($830K)

(U) Work Performed By: This project is managed by Armstrong Laboratory, Mesa, AZ. The major contractors are: University of Dayton, Dayton, OH; McDonnell Douglas, St. Louis, MO; Martin Marietta Corporation, Daytona Beach, FL; and LORAL, Orlando, FL.

(U) Related Activities:
- (U) PE 0602205F, Personnel, Training, and Simulation.
- (U) PE 0604227F, Flight Simulator Development.
- (U) The Navy has a liaison office at Armstrong Laboratory.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2922, Manpower and Force Management: This Manpower, Personnel, and Training (MPT) project develops technology to understand and consider MPT factors early in weapon systems design and acquisition to ensure the factors are supportable, and to enable trade offs to accommodate MPT limitations and costs. Timely consideration of these factors will reduce weapon systems development and life cycle costs. Advanced technologies will be developed to collect and analyze MPT information and develop personnel assessment technologies for improved manpower and force management.

Program Element: #0603227F
PE Title: Personnel, Training, and Simulation Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed initial technology to assess the impact of Manpower, Personnel, and Training (MPT) within the acquisition decision process. ($668K)
- (U) Completed the initial release of the manpower estimation tool for estimating required personnel associated with a specific weapon system design to permit designers to trade off manpower costs with alternative design options. ($668K)

(U) FY 1994 Planned Program:
- (U) Complete transition documentation for the technology for Integrated Manpower, Personnel, and Comprehensive Training and Safety (IMPACTS) technology. ($50K)
- (U) Develop technology for estimating manpower requirements, and training resources and requirements for new weapon systems designs to permit designers to trade off manpower and training costs with alternative design options. ($611K)
- (U) Complete initial release of technology for MPT database integration. ($827K)

(U) FY 1995 Planned Program:
- (U) Complete MPT acquisition decision support technology to permit designers to trade off manpower and training costs with alternative design options. ($1,075K)
- (U) Test and evaluate MPT decision support technology and transition to aircraft design community. ($417K)
- (U) Develop situational awareness pilot selection test battery technology. ($150K)

(U) Work Performed By: This project is managed by the Armstrong Laboratory, Brooks AFB, TX. The major contractor is: Dynamics Research Corp., Wilmington, MA.

(U) Related Activities:
- (U) PE 06022205F, Personnel, Training, and Simulation.
- (U) PE 0604243F, Manpower, Personnel, and Training Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2949, Advanced Training Technology: This project develops and demonstrates: computer-based intelligent tutoring technology for adaptive expertise across tasks in high-technology jobs; and software enabling Air Force training developers to rapidly and affordably build intelligent computer-assisted training systems which continually interact with students for effective individualized training.

Program El...ent: #0603227F
PE Title: Personnel, Training, and Simulation Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed second-generation rapid intelligent tutoring technology. ($998K)
- (U) Completed transition documentation for the intelligent technical training authoring technology to the Air Force training community. ($275K)
- (U) Completed first user-built intelligent tutor using the intelligent technical training authoring shell for simplifying tutor development. ($562K)
- (U) Completed field assessment of avionics troubleshooting tutor. ($700K)

(U) FY 1994 Planned Program:
- (U) Demonstrate and evaluate authoring shell for advanced intelligent tutors. ($430K)
- (U) Complete intelligent tutors requirement specification and evaluate software. ($827K)
- (U) Assess and deliver avionics and mechanical job family tutor technology. ($700K)

(U) FY 1995 Planned Program:
- (U) Develop and evaluate advanced technology for intelligent tutor authoring, including advanced man-machine interface. ($1,076K)
- (U) Develop career field education and training planning software. ($580K)
- (U) Develop and demonstrate technology for avionics and mechanical job family tutors. ($615K)

(U) Work Performed By: This project is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: University of Pittsburgh, Learning R&D Center, Pittsburgh, PA; and University of Southern California, Los Angeles, CA.

(U) Related Activities:
- (U) PE 0602205F, Personnel, Training, and Simulation.
- (U) PE 0604243F, Manpower, Personnel, and Training Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603231F
PE Title: Crew Systems and Personnel Protection Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2722 Aerospace Chemical, Biological, and Directed Energy Defense	3,234	2,691	0	0	0	0	0	0	5,925
2829 Crew-Centered Cockpit Design	3,785	2,329	2,221	2,001	2,053	2,123	2,123	Cont	TBD
2830 Advanced Life Support	3,832	3,518	3,928	4,286	3,054	3,130	3,130	Cont	TBD
2868 Crew Escape	2,195	2,197	4,524	5,124	5,878	6,582	6,795	Cont	TBD
3257 Helmet-Mounted Sensory Technologies	3,853	2,153	5,927	6,631	7,570	7,967	5,013	Cont	TBD
Total	16,899	12,888	16,600	18,042	18,555	19,802	17,061	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops and demonstrates technologies to protect and enhance the performance of Air Force personnel in operational environments. Specific projects advance and integrate human factors technologies into cockpit, life support, and aircrew equipment designs.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2722, Aerospace Chemical, Biological, and Directed Energy Defense: This project develops technology to protect Air Force members performing duty in hazardous environments. The goal is to maintain sortie generation rates and effectively treat casualties in any type of combat environment. The technology is expressed primarily in computer models that predict effects on fighting forces from conventional weapons attack, blast, non-battle injuries, and combat stress; and quantifies replacement needs for medical personnel and equipment to sustain a given level of combat capability.

   (U) FY 1993 Accomplishments:
   - (U) Developed and conducted assessment of attrition models to predict number of Air Force casualties due to airbase attacks. ($1,949K)
   - (U) Developed and assessed the first/second echelon model and the medical work center components of the attrition model to predict losses and casualties for personnel and medical resources replacement planning. ($1,285K)

Program Element: #0603231F
PE Title: Crew Systems and Personnel Protection Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Complete and transition the facility model for attrition and the casualty generation model to Engineering and Manufacturing Development (EMD). ($848K)
- (U) Transition wartime medical planning technology for the third/fourth echelon model to EMD and initiate design of a wartime medical theater model. ($1,124K)
- (U) Develop technology to improve survivability of air and ground crew supporting air operations in hazardous environments. ($285K)
- (U) Improve modeling and operational analysis capabilities for personnel protection, combat sustainability, and casualty prediction. ($434K)

(U) FY 1995 Planned Program: Not Applicable

(U) Work Performed By: This project is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: BDM Federal, McLean, VA; Rothe Development Inc., San Antonio, TX; and SAIC, McLean, VA.

(U) Related Activities:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0604703F, Aeromedical/Casualty Care Systems Development.
- (U) PE 0604601F, Chemical Defense Equipment.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2829, Crew-Centered Cockpit Design: This project develops, demonstrates, and transitions (to industry and government users) the crew station design technology needed to design safe cockpits that enhance the crews' ability to perform the mission. Based on system engineering, human factors principles, mission requirements and crew capabilities, a rigorous, traceable, and human-centered way to design and test cockpits is provided. Products are a crew-centered cockpit design process, computer tools and databases, and a flight test engineer's work station for crew station evaluation.

(U) FY 1993 Accomplishments:
- (U) Demonstrated human-centered cockpit design procedures and new software support tools via example study of a fighter cockpit upgrade. ($2,210K)
- (U) Expanded technology development of engineer's work station for supporting flight test evaluation to include ground-based assessment, development, and field test. ($1,575K)

Program Element: #0603231F
PE Title: Crew Systems and Personnel Protection Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Demonstrate crew-centered cockpit design process and software tools for crew station modifications for multi-place aircraft, including special operations applications. ($1,590K)
- (U) Conduct technology demonstration at flight test centers of computer support technology to enhance assessment process of new crew station designs. ($739K)

(U) FY 1995 Planned Program:
- (U) Demonstrate human-centered design and software support for cockpit technology insertion. ($1,700K)
- (U) Complete demonstration and documentation of a computer work station for use by flight test engineers in conducting cockpit evaluations; permits enhanced objectivity in the evaluation and design process, resulting in a more efficient process. ($377K)
- (U) Develop field assessment procedure for new software tools for cockpit design. ($144K)

(U) Work Performed By: This project is managed by Armstrong Laboratory, Wright-Patterson AFB, OH. The major contractors are: Veda Inc., Dayton, OH; and Calspan Inc., Buffalo, NY.

(U) Related Activities:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2830, Advanced Life Support: This project develops and demonstrates advanced aircrew life support technologies. The goal is to improve combat performance while protecting the aircrew from physiological stresses such as high altitudes, high G-forces, thermal burden, directed energy, and injury from projectiles.

(U) FY 1993 Accomplishments:
- (U) Completed and transitioned the advanced technology anti-G suit to Engineering and Manufacturing Development (EMD). ($1,100K)
- (U) Continued development of advanced technology for integrating aircrew laser eye protection with new helmet and face mask technology. ($1,232K)
- (U) Continued development of advanced technology for enhanced full pressure suit. ($700K)
- (U) Completed data collection for new acceleration protective technologies based on optimizing breathing pressure. ($800K)

Program Element: #0603231F
PE Title: Crew Systems and Personnel Protection Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop laser eye protection advanced technology for integration with helmet and face mask technology. ($650K)
- (U) Develop advanced technologies to protect aircrew against projectiles in the cockpit during combat. ($300K)
- (U) Develop improved positive-pressure breathing oxygen mask technology. ($350K)
- (U) Develop advanced technology for aircrew personal environmental cooling. ($200K)
- (U) Develop technology for integration of aircrew protective and performance-enhancing equipment. ($2,018K)

(U) FY 1995 Planned Program:
- (U) Develop laser eye protection advanced technology for integration with helmet and face mask technology. ($350K)
- (U) Develop and integrate advanced technologies for protection of aircrew against projectiles during combat. ($300K)
- (U) Develop advanced technology for improved positive-pressure breathing oxygen mask. ($350K)
- (U) Develop technology for advanced oxygen systems to replace the requirement for liquid oxygen in air-transportable hospitals reducing the logistical burden during deployment. ($400K)
- (U) Develop technology for integration of aircrew protective and performance-enhancing equipment, such as combining the G-suit's positive-pressure breathing mask with the chemical/biological protective suit for aircrew. ($559K)
- (U) Improve technology for survivability of air and ground crew supporting air operations in hazardous environments. ($500K)
- (U) Develop operational analysis capabilities for wartime medical planning, personnel protection, and combat sustainability. ($1,469K)

(U) Work Performed By: This project is managed by Armstrong Laboratory, Brooks AFB, TX. The major contractors are: ILC Dover, Dover, DE; KRUG International, Dayton, OH; The Analytical Services Corp., New York, NY; Battelle Memorial Institute, Columbus, OH; and Systems Research Laboratories, San Antonio, TX.

(U) Related Activities:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0604706F, Life Support Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 2868, Crew Escape: This project develops and demonstrates advanced crew escape technologies to protect the aircrew during ejection. The goal is to reduce aircrew fatalities and major injuries in emergency ejections at air speeds up to 700 knots equivalent air speed (KEAS) and at low altitude, adverse attitudes. This project will also improve escape system reliability, maintainability, and logistics supportability.

Program Element: #0603231F
PE Title: Crew Systems and Personnel Protection Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

Increase in FY 1995 funding over FY 1994 level is due to increased emphasis on the accommodation of females to the ejection seats of combat aircraft.

(U) FY 1993 Accomplishments:
- (U) Integrated advanced dynamic anthropomorphic manikin and rocket sled to create a unique capability for escape technologies demonstrations. ($607K)
- (U) Demonstrated inertial reel haulback technology to reduce time required to position upper torso in seat from 300 milliseconds to 150 milliseconds. ($30K)
- (U) Continued development of technologies for demonstration of both gel and solid propellant escape propulsion. ($1,558K)

(U) FY 1994 Planned Program:
- (U) Develop technologies for demonstration of both gel and solid propellant escape propulsion. ($1,899K)
- (U) Complete trade studies of escape system flight control and high-speed life protection devices. ($298K)

(U) FY 1995 Planned Program:
- (U) Demonstrate both gel and solid propellant escape propulsion technologies with eight bench-level, full-duty-cycle tests. ($2,000K)
- (U) Complete design of both escape system flight control and high-speed life protection technologies. ($600K)
- (U) Begin fabrication of flight test hardware for a technology demonstration of an advanced ejection seat for crew escape. ($1,924K)

(U) Work Performed By: This project is managed by Armstrong Laboratory, Wright-Patterson AFB, OH. The program is jointly staffed and funded by: Armstrong Laboratory, Brooks AFB, TX; Wright Laboratory, Wright-Patterson AFB, OH; and Naval Air Systems Command. Washington, DC. The major contractors are: Systems Research Laboratories, Dayton, OH; Rockwell International, Los Angeles, CA; Frost Engineering, Englewood, CO; Atlantic Research Corp., Gainsville, VA; and McDonnell Douglas Missile Systems Co., Titusville, FL.

(U) Related Activities:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602269F, Hypersonic Flight Technology.
- (U) PE 0604706F, Life Support Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603231F
PE Title: Crew Systems and Personnel Protection Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

5. (U) Project 3257, Helmet-Mounted Sensory Technologies: This project develops and demonstrates advanced helmet-mounted subsystem technologies to improve mission effectiveness and pilot situational awareness during day and night missions in all weather conditions. Through the development of advanced helmet-mounted tracker and display technologies, pilots will be able to detect, identify, target, and launch weapons faster and more accurately. This project also supports the improvement of night vision goggles (NVGs) technology for Air Force applications to enhance capabilities at night. Increase in FY 1995 funding over FY 1994 level is due to increased emphasis on a demonstration of technologies for a helmet-mounted sight to enhance combat capability of fighter aircraft at close range.

(U) FY 1993 Accomplishments:
- (U) Transitioned integrated goggle and head tracking technology and NVG-Head-Up Display (HUD) technology to Engineering and Manufacturing Development (EMD). ($477K)
- (U) Demonstrated safe high-voltage quick disconnect connector for use with helmet-mounted tracker and displays (HMT/Ds) in an explosive environment. ($481K)
- (U) Developed hybrid video pre-amp and amplifier chips for improving the performance of HMT/Ds and transitioned technology to industry. ($472K)
- (U) Demonstrated three-dimensional (3-D) audio localization on an AV-8B for reducing target acquisition times. ($282K)
- (U) Evaluated new HGU-53/P helmet technology for use by Air Force aircrews. ($238K)
- (U) Demonstrated utility of HMT/D on two F-15C aircraft. ($1,425K)
- (U) Developed criteria for safe HMT/D head and neck loads. ($478K)

(U) FY 1994 Planned Program:
- (U) Develop miniature cathode ray tube (CRT) technology optimized for daytime use on helmet-mounted tracker and displays (HMT/Ds). ($165K)
- (U) Demonstrate standardized helmet-vehicle interface for binocular HMT/Ds in ejection seat equipped aircraft. ($435K)
- (U) Demonstrate target acquisition with high off-boresight missile seekers using HMT/D technology on two operational F-15C aircraft. ($235K)
- (U) Demonstrate utility of 3-D audio localization for close air support on an OV-10. ($195K)
- (U) Develop improved set of flight-qualified display electronics for helmet-mounted technology. ($215K)
- (U) Study alternative design requirements for new HMT/D for fighter aircraft. ($908K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate helmet-vehicle interfaces for HMT/Ds. ($610K)
- (U) Conduct laboratory test of new advanced HMT/D for fighter aircraft. ($2,960K)
- (U) Develop new image source technology for HMT/D and for NVG-HUD. ($2,159K)
- (U) Study anthropometric issues for fit of HMT/Ds on full pilot population. ($198K)

Program Element: #0603231F
PE Title: Crew Systems and Personnel Protection Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) Work Performed By: This project is managed by Armstrong Laboratory, Brooks AFB, TX. In-house development and testing are conducted by Armstrong Laboratory, Wright-Patterson AFB, OH. The major contractors are: McDonnell Douglas Aircraft Co., St. Louis, MO; Reynolds Industries Inc., Los Angeles, CA; Honeywell Military Avionics, Minneapolis, MN; Systems Research Laboratory, Dayton, OH; and Hughes Display Systems, Lexington, KY.

(U) Related Activities:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0603238F, Global Surveillance and Communications.
- (U) PE 0604706F, Life Support Systems.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603238F
PE Title: Global Surveillance and Communications
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
4185 Near-Real-Time Precision Strike	4,676	0	0	0	0	0	0	0	4,676
4216 Information Application Technology	0	0	6,200	15,400	15,879	16,917	15,994	Cont	TBD
4217 Information Management and Integration Technologies	0	0	8,300	15,169	14,500	14,000	13,500	Cont	TBD
Total	4,676	0	14,500	30,569	30,379	30,917	29,494	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program will develop and demonstrate the technologies required to link national command authorities and sources to deployed Air Force components of a Joint Task Force, regardless of location, and provide a global interactive distributed infrastructure with which commanders, staff, and warfighters can obtain immediate access to critical Command and Control (C2) information associated with all phases of mission planning, execution, and assessment. The global concept calls for use of the evolving worldwide commercial fiber optic communications infrastructure to provide wide-bandwidth DOD communications. This program develops the information transmission, services, and management functions needed to reach the warfighter. This program directly responds to user needs as expressed by the Joint Staff (Command, Control, Communications, Computers, and Intelligence for the Warrior), Air Force (Theater Deployable Communications), Air Mobility Command (Airborne Situational Awareness), and the Defense Information Systems Agency (Far-Term Defense Information Systems Network).

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 4185, Near-Real-Time Precision Strike: This project simulates, integrates, and demonstrates air vehicle, strike planning, and weapon systems technologies to meet the capability to achieve affordable, adverse-weather (night/day) precision strike (less than three meters circular error probable (CEP)) with conventional munitions from standoff distances against time-critical fixed and mobile (stationary) surface targets. This includes: enroute targeting, using data from on-board sensors or data from off-board assets such as a reconnaissance aircraft; responsive mission planning; precision weapon delivery; and battle damage assessment. The focus includes: fusion of multi-source sensor data; linking information to shooter aircraft to produce required targeting data for download to the weapon; command, control, communication, and near-real-time (minutes not hours) mission planning; strike option generation and analysis; battle damage assessment; and replan/restrike decisions. This project has been terminated.

   (U) FY 1993 Planned Program:
   - (U) Developed precision strike targeting models and simulations for multiple weapon delivery employing precision munitions. ($4,300K)
   - (U) Planned simulations for automated mission planning system upgrades to enable real-time replanning and theater-wide deconfliction of precision strike missions. ($376K)

Program Element: #0603238F
PE Title: Global Surveillance and Communications
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by the Wright Laboratory, Wright-Patterson AFB, OH, with participation from Rome Laboratory, Griffiss AFB, NY. The major contractors are: Westinghouse Electric Corp., Baltimore, MD; Hughes Aircraft, El Segundo, CA; Northrop Corp., Hawthorne, CA; and McDonnell Douglas, St. Louis, MO.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0602602F, Conventional Munitions.
- (U) PE 0602702F, Command, Control, and Communications.
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0603601F, Conventional Weapons.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 4216, Information Application Technology: This project develops and demonstrates the network fabric composed of switches, gateways, and transmission systems which will allow a deployed warrior to reach back to national resources, through a high performance multi-national commercial/military communications infrastructure, for multimedia Command and Control (C2) information. Robust and survivable communications protocols will be developed to maintain network structure and provide uninterrupted flow of vital information while maintaining compatibility with established international standards. Wideband, programmable radio frequency and optical transmission technologies will be integrated into this switching fabric to allow a surge to remote and mobile users. Work will address interoperation across echelon, Service, and multi-national force boundaries, as well as provide support for mobile C2 and sensor to shooter operations.

(U) FY 1993 Planned Program: Not Applicable.

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program:
- (U) Implement four nation (U.S., Canada, UK, Australia) cooperative network utilizing DOD developed cooperative gateways based on a policy-based Internet Protocol suite. ($1,900K)
- (U) Implement a DOD developed distributed network integrated with each of the four nations' respective public carriers, all interconnected, using international standards. ($2,800K)
- (U) Conduct initial demonstration of technologies for an advanced distributed Air Operations Center. ($1,500K)

(U) Work Performed By: This program is managed by the Rome Laboratory, Griffiss AFB, NY. The major contractors are to be determined.

Program Element: #0603238F
PE Title: Global Surveillance and Communications
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) Related Activities:
- (U) PE 0602702F, Command, Control, and Communications (C3).
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 4217, Information Management and Integration Technologies: This project develops and demonstrates advanced technologies to provide commanders and warfighters with access, integrity, and survivable services from the global information network as it supports deployed distributed components, as well as provide distributed real-time network and information management for this deployed force. Advanced information representation capabilities will be developed to provide commanders with an interactive, common picture of the battle space. Distributed information management concepts will be developed and demonstrated which will provide overall optimization and control of the entire information system, including deployed resources, operating as part of a global infrastructure. Work will focus on technologies for improved management of communications, distributed computing, and security resources, as well as improved security and integrity of the management system itself.

(U) FY 1993 Accomplishments: Not Applicable.

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program:
- (U) Develop advanced technologies and protocols for assured warfighter access to the global information network based on analysis of operational military constraints, available military and commercial wideband technology, and command and control system requirements. ($3,000K)
- (U) Develop advanced multi-media and interactive technologies for improved warfighter global and local situational awareness. ($1,200K)
- (U) Conduct initial demonstration of distributed information management technologies in a tri-Service operational network management facility. ($4,100K)

(U) Work Performed By: This program is managed by the Rome Laboratory, Griffiss AFB, NY. The major contractors are to be determined.

(U) Related Activities:
- (U) PE 0602702F, C3.
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603245F
PE Title: Advanced Flight Vehicle Multidisciplinary Technologies
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2061 Avionics Technology Integration	9,986	0	0	0	0	0	0	Cont	TBD
2568 Air Vehicle Technology Integration	1,503	1,296	18,100	14,544	16,763	16,339	14,629	Cont	TBD
2682 Propulsion Technology Integration	5,963	0	0	0	0	0	0	Cont	TBD
2979 Weapons Technology Integration	198	0	0	0	0	0	0	Cont	TBD
Total	17,650	1,296	18,100	14,544	16,763	16,339	14,629	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program accomplishes the integration and flight demonstration function to improve the performance and supportability of existing, as well as future aircraft. The system level integration brings together the air vehicle technologies with avionics, propulsion, and weapon systems to flight demonstrate in a realistic operational environment. The integration and flight test reduces the risk and time required to transition technologies into operational aircraft. These air vehicle technology programs provide demonstrated flight vehicle and dual-role technologies for all-weather, day/night operations, and technologies for affordability. FY 1995 ramp due to Congressional reduction in FY 1994.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2061, Avionics Technology Integration: This project integrated avionics technologies and flight demonstrated integrated aircraft technologies in a realistic operational environment.

U) FY 1993 Accomplishments:
- (U) Continued to integrate advanced avionics technologies into simulators for user evaluation of increased combat effectiveness. ($2,560K)
- (U) Continued to integrate and flight test advanced avionics technologies in test and operational aircraft for user evaluation of increased combat effectiveness. ($7,426K)

Program Element: #0603245F
PE Title: Advanced Flight Vehicle Multidisciplinary Technologies
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: McDonnell Douglas, St. Louis, MO; Lockheed, Ft. Worth; TX; TRW, San Diego, CA; Martin Marietta, Binghamton, NY; and Honeywell, Minneapolis, MN.

(U) Related Activities:
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603253F, Advanced Avionics Integration.
- (U) PE 0603601F, Conventional Weapons.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2682, Propulsion Technology Integration: Developed the technologies to integrate propulsion systems (inlets, engines, and nozzles) with the airframe technologies. The Multi-Axis Thrust Vectoring (MATV) program demonstrated low-to-moderate speed, unlimited angle-of-attack maneuvering using the Variable Stability In-flight Simulator Test Aircraft (VISTA) F-16D and a General Electric engine with a vectoring nozzle.

(U) FY 1993 Accomplishments:
- (U) Conducted user flight evaluation of thrust vectoring for low-, medium-, and high-speed cruise and maneuvering performance enhancements. ($5,963K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: Lockheed, Ft. Worth, TX; McDonnell Douglas, St. Louis, MO; United Technology, Windsor Locks, CT; General Electric, Evendale, OH; and Pratt and Whitney, West Palm Beach, FL.

Program Element: #0603245F
PE Title: Advanced Flight Vehicle Multidisciplinary Technologies
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date. February 1994

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603216F, Aerospace Propulsion and Power.
- (U) PE 0604237, Variability In-flight Simulator Test Aircraft.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2979, Weapons Technology Integration: This project integrated weapons with the air vehicle technologies. Integration of weapons includes physical integration, as well as functionally controlling the weapons. Air vehicle performance (observability, maneuverability, and speed) should not be degraded nor should any of the air vehicle subsystems be adversely affected.

(U) FY 1993 Accomplishments:
- (U) Developed weapon simulation models and assessed radar cross section (RCS) of advanced fighters/weapons. ($198K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: Lockheed, Ft. Worth TX; Hughes Aircraft, Canoga Park, CA; Northrop, Pico Rivera, CA; Boeing, Seattle, WA; and McDonnell Douglas Co., St. Louis, MO.

(U) Related Activities:
- (U) PE 0603601F, Conventional Weapons.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603245F
PE Title: Advanced Flight Vehicle Multidisciplinary Technologies

Project Number: 2568
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Air Vehicle Technology Integration	1,503	1,296	18,100	14,544	16,763	16,339	14,629	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Advanced Development project provides the integration and flight demonstration of aeromechanics, flight control, propulsion, weapons, and vehicle subsystems technologies into an aircraft for flight demonstrations in a realistic operational environment. This project leverages Air Force funds with NASA to demonstrate and test the military utility of advanced air vehicle technologies. Demonstrations are conducted with using command participation so that technology maturation and transition opportunities can be determined.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Developed and demonstrated advanced aeromechanics and flight control technologies for user evaluation of increased combat effectiveness. ($1,105K)
   - (U) Developed and demonstrated advanced subsystem technologies and technology integration for increased supportability of air vehicles. ($398K)

2. (U) FY 1994 Planned Program:
   - (U) Continue to develop and demonstrate advanced aeromechanics and flight control technologies for user evaluation of increased combat effectiveness. ($1,296K)

3. (U) FY 1995 Planned Program:
   - (U) Continue to develop and demonstrate advanced aeromechanics and flight control technologies for user evaluation of increased combat effectiveness. ($9,883K)
   - (U) Continue to develop and demonstrate advanced subsystem technologies and technology integration for increased supportability of air vehicles. ($8,217K)

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

Program Element: #0603245F
PE Title: Advanced Flight Vehicle Multidisciplinary Technologies
Project Number: 2568
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

D. (U) WORK PERFORMED BY: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The major contractors are: Lockheed, Ft. Worth, TX; McDonnell Douglas, St. Louis, MO; Boeing, Seattle, WA; Martin Marietta, Atlanta, GA; and Canadian Commercial Corporation, Ottawa, Canada.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
- (U) AMC MNS 011-93, Improved Mobility Aircraft Cockpits (Draft).
- (U) AMC MNS 018-93, Improved Cockpit for the KC-135 (Draft).
- (U) TAF 304-83, Advanced Tactical Fighter, 10 Aug 93.

G. (U) RELATED ACTIVITIES:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603205F, Aerospace Vehicle Technology.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

1.	(U) Complete Common Airlifter Cockpit design	Jun 95
2.	(U) Complete design of active forebody control system	Aug 95
3.	(U) Complete control software for F-15 tailless flight demonstration	Sep 95
4.	(U) Complete Common Airlifter Cockpit simulation	May 96
5.	(U) Complete fabrication of active forebody vortex control system	Sep 96
6.	(U) Complete Common Airlifter Cockpit design tailored for Tanker Application	Apr 97

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element. #0603250F
PE Title: Lincoln Laboratory

Project Number: 649L
Budget Activity. #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

A (U) RESOURCES ($ in Thousands).

Project Title Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Lincoln Laboratory	24,958	17,437	15,000	15,388	5,179	0	0	0	77,962

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES The Lincoln Laboratory program is a high technology research and development effort conducted through a cost reimbursable contract with the Massachusetts Institute of Technology (MIT). Lincoln Laboratory is operated as a Federally Funded Research and Development Center (FFRDC) administered by the Department of Defense. This Advanced Development program provides advanced research and technology demonstration in the areas of military satellite communications, space radar technology, space-based visible surveillance, deep-space and tactical battlefield surveillance, advanced solid state devices, materials, and processing technology.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS.

1. (U) FY 1993 Accomplishments:
   - (U) Conducted an advanced radar technology program to detect and identify time-critical targets. ($4,585K)
   - (U) Investigated the technology of global high-rate networking at data rates from tens of megabits per second to tens of gigabits per second for lightweight laser communication satellite internetting and broadband multi-beam antennas to interconnect multiple tactical users. ($6,175K)
   - (U) Continued an advanced electro-optical technology program in support of the mission of detection, tracking, and identification of all man-made objects in earth orbit from both earth-based and space-based platforms. ($3,440K)
   - (U) Pursued activities to conceive, demonstrate, and provide advanced electronic devices, circuits, and subsystems for the Air Force and other DoD systems and to transfer appropriate technologies to industry ($10,758K)

2. (U) FY 1994 Planned Program:
   - (U) Continue the advanced radar technology program to detect and identify time-critical targets. ($3,171K)
   - (U) Continue to investigate the technology of global high-rate networking at data rates from tens of megabits per second to tens of gigabits per second for lightweight laser communication satellite internetting and broadband multi-beam antennas to interconnect multiple tactical users ($4,321K)
   - (U) Continue the advanced electro-optical technology program in support of the mission of detection, tracking, and identification of all man-made objects in earth orbit from both earth-based and space-based platforms. ($2,343K)
   - (U) Continue activities to conceive, demonstrate, and provide advanced electronic devices, circuits, and subsystems for the Air Force and other DoD systems and to transfer appropriate technologies to industry. ($7,602K)

Program Element: #0603250F
PE Title: Lincoln Laboratory

Project Number: 649L
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date February 1994

3 (U) FY 1995 Planned Program.
- (U) Continue the advanced radar technology program to detect and identify time-critical targets. ($2,728K)
- (U) Continue to investigate the technology of global high-rate networking at data rates from tens of megabits per second to tens of gigabits per second for lightweight laser communication satellite internetting and broadband multi-beam antennas to interconnect multiple tactical users. ($3,717K)
- (U) Continue the advanced electro-optical technology program in support of the mission of detection, tracking, and identification of all man-made objects in earth orbit from both earth-based and space-based platforms ($2,016K)
- (U) Continue activities to conceive, demonstrate, and provide advanced electronic devices, circuits, and subsystems for the Air Force and other DoD systems and to transfer appropriate technologies to industry. ($6,539K)

D (U) WORK PERFORMED BY: There are no prime contractors that support this program. Funds are used to pay salaries and purchase supplies for in-house activities at Lincoln Laboratory.

E (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
- (U) Massachusetts Institute of Technology Lincoln Laboratory Federal Contract Research Center Charter, 1952.
- (U) DoD Plan for Administration of Lincoln Laboratory, May 1975

G. (U) RELATED ACTIVITIES:
- (U) PE 0303603F, MILSTAR.
- (U) PE 0602702F, Command, Control, and Communications
- (U) PE 0102424F, Space Track.
- (U) PE 0102428F, Space Surveillance Technology
- (U) PE 0303401F, Communications Security.
- (U) PE 0601102F, Defense Research Sciences.
- (U) PE 0601101E, Defense Research Sciences
- (U) PE 0602301E, Wafer-Scale Integration.
- (U) PE 0603789F, Command, Control, Communications, and Intelligence.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE. Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603253F
PE Title: Advanced Avionics Integration
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2733 Advanced Reconnaissance/Strike Radars*	5,376	0**	0	0	0	0	0	Cont	TBD
2735 Avionics Integration Technology	10,584	0**	8,187	9,152	9,866	8,727	7,521	Cont	TBD
3833 Modular Avionics Subsystems Technology	2,868	0**	7,629	7,406	7,607	7,901	6,546	Cont	TBD
666A Reference and Information Transmission Technology	3,249	3,474	8,684	8,189	7,607	7,960	8,356	Cont	TBD
Total	22,077	3,474	24,500	24,747	25,080	24,588	22,423	Cont	TBD

* Project content transferred to PE 0603203F, Project 69DF, beginning in FY 1995.
** FY 1994 requested funding denied by Congress

B. (U) BRIEF DESCRIPTION OF ELEMENT: Air Force Global Reach-Global Power strategy has a force structure that contains combat aircraft with manageable pilot workload that are able to defeat increasingly sophisticated threats, operate in a dense threat environment, and reliably perform complex missions with less logistics support. This program responds to these needs by developing and demonstrating technologies and techniques to improve communications, navigation, identification, and cockpit display integration in order to improve overall aircraft performance and reduce pilot workload during mission operations, as well as reduce avionics support costs. This program develops and improves advanced technology to include: solid state and stellar inertial guidance units and Global Positioning System (GPS) receivers; low probability of detection airborne communications for shared situation awareness; highly reliable and easily maintainable avionics architectures and advanced processors, to include artificial intelligence processors for aircrew workload reduction and situation awareness; and integration techniques to reduce aircraft electronic emissions for improved aircraft hostile airspace penetration capability. This Advanced Development program was restructured beginning in FY 1995 to focus on the above described advanced technologies that will enable continued avionics superiority

Program Element: #0603253F
PE Title: Advanced Avionics Integration
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date. February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2733, Advanced Reconnaissance/Strike Radars: Develops and demonstrates radar technologies and techniques for detecting and targeting ground and airborne targets in difficult background conditions, with emphasis on countering improvements in low-observable (LO) technology and camouflage, concealment, and deception techniques that limit current capability to detect and track such targets. Content transferred to Program Element 0603203F, Project 69DF beginning in FY 1995 to consolidate limited resources for airborne sensor advanced development efforts in a single Air Force Science and Technology project.

   (U) FY 1993 Accomplishments:
   - (U) Demonstrated adverse-weather, near-real-time target recognition capability. ($1,826K)
   - (U) Validated simulation tool for laboratory testing of ultra-high resolution synthetic aperture radar (SAR) motion compensation techniques using recorded flight data. ($650K)
   - (U) Developed algorithms and preliminary design of foliage penetration radar for reliable concealed/camouflaged time-critical target detection. ($2,900K)

   (U) FY 1994 Planned Program: Not Applicable.

   (U) FY 1995 Planned Program: Not Applicable.

   (U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: ERIM, Ann Arbor, MI; Loral Systems, Litchfield Park, AZ; Martin Marietta, Denver, CO; Westinghouse, Baltimore, MD; and Holomax Ltd., Toronto, Canada.

   (U) Related Activities:
   - (U) PE 0602204F, Aerospace Avionics.
   - (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
   - (U) PE 0603226E, Experimental Evaluation of Major Innovative Technologies.
   - (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

   (U) Other Appropriation Funds: Not Applicable.

   (U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2735, Avionics Integration Technology: Develops and demonstrates technologies that provide for a robust implementation and exploitation of offensive, defensive assets, to include communications, navigation, identification (CNI) subsystems, and that provide for reduced avionics support costs, weight, and volume; and improved reliability. These advanced technologies provide for the avionics "glue" that enables improved cockpit systems management, information display, and weapons targeting and tracking and includes integrated avionics architectures, information integration involving on-board and off-board assets, and sensor management technologies.

Program Element: #0603253F
PE Title: Advanced Avionics Integration
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed design specifications for standardized modular and shareable resources to support low-cost integrated sensor technologies. ($314K)
- (U) Developed adaptive processing technology for incorporation into advanced infrared search and track sensor that will be integrated into an avionics suite for evaluation. ($6,900K)
- (U) Completed design of a high performance computer repackaged in an avionics compatible format to meet requirements for advanced avionics subsystems. ($1,250K)
- (U) Designed ultra-reliable radio frequency modules for improved radar life cycle. ($312K)
- (U) Developed and tested real-time artificial intelligence brassboard for cost-effective expert system and database processing. ($1,808K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program:
- (U) Develop advanced modular, sharable radio frequency sensor signal processing technologies to provide for avionics cost and weight savings, improved reliability, and increased sensor data fusion opportunities. The modularity will allow for retrofit applications to provide for support cost reducing upgrades. ($3,874K)
- (U) Develop advanced sensor integration technologies and algorithms to provide the capability to augment the performance of individual sensors which will enable improved fault tolerance and situation awareness. ($1,565K)
- (U) Develop technologies to provide for transition of current generation integrated avionics elements into retrofit applications enabling increased service life with significant support cost savings. ($2,748K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Westinghouse Electric Corp., Baltimore, MD; TI, Dallas, TX; AT&T, Whippany, NJ; McDonnell Douglas, St. Louis, MO; and Martin Marietta, Orlando, FL.

(U) Related Activities:
- (U) PE 0601729A, Night Vision Electro-Optics.
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0604609F, Reliability and Maintainability Technology Insertion Program.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3833, Modular Avionics Subsystems Technology: Develops and demonstrates the avionics technology modular "building blocks" that compose advanced integrated avionics and that provide desired functional performance along with savings in cost, weight, and volume with improved reliability. This project concentrates on technologies for data management and presentation, packaging and cooling, and processing.

Program Element: #0603253F
PE Title: Advanced Avionics Integration
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Conducted operational test demonstration of integrated avionics for threat avoidance and laser obstacle avoidance capability. ($650K)
- (U) Developed models for analysis of sensor management data fusion algorithms for advanced threat identification and location for on-board replanning and terrain following. ($268K)
- (U) Demonstrated common module reconfiguration strategies, Ada software partitioning for distributed filters, and pooled spare concepts for fault tolerant avionics. ($1,950K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program:
- (U) Develop advanced avionics packaging and cooling technologies for modular avionics to provide the capability for decreased volume and high reliability processing elements with needed performance. ($2,407K)
- (U) Develop a scalable real-time parallel processor network, employing commercially available elements, to provide a capability for real-time processing of demanding sensor data algorithms and other computations. ($864K)
- (U) Develop a consolidated data base management capability to provide a capability of a common data store for sensor data sharing amongst avionics subsystems that will allow increased subsystem accuracy. ($2,207K)
- (U) Develop avionics integration performance evaluation facility to provide a capability for low-cost avionics validation which will in turn minimize expensive flight test requirements. ($2,151K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: IBM, Owego, NY; McDonnell Douglas, Long Beach, CA; Rockwell, Anaheim, CA; Lockheed, Ontario, CA; and TRW, Dayton, OH.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 666A, Reference and Information Transmission Technology: Develops and demonstrates advanced reference and information transmission technologies and techniques to provide for a capability to improve the accuracy and availability of navigation and situation awareness information and to increase survivability by reducing navigation and communication electromagnetic signatures. The focus is on inertial components and systems technology, jam resistant low probability of detection (LPD) transceivers, low-observable multifunction antennas, information transfer links, adaptive techniques to reduce co-site interference, and techniques for exploiting the capabilities of the Global Positioning System to provide high accuracy reference information.

Program Element: #0603253F
PE Title: Advanced Avionics Integration
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Developed advanced inertial reference technology and architecture to improve robustness of reference functions and weapon/sensor boresight accuracy. ($2,550K)
- (U) Developed enhancements to Global Positioning System (GPS) user equipment and system integration techniques to maximize position accuracy and jam resistance and exploit the benefits of GPS to improve offensive and defensive combat capabilities at reduced costs. ($200K)
- (U) Developed advanced very-high-reliability all-solid state navigation and reference systems technologies to provide for reduced life cycle costs and increased navigation system availability in both new system and retrofit applications. ($249K)
- (U) Demonstrated a low-observable, wideband multifunction antenna for communication, navigation, and identification functions. ($250K)

(U) FY 1994 Planned Program:
- (U) Develop advanced inertial reference technology and architecture to improve robustness of reference functions and weapon/sensor boresight accuracy. ($2,699K)
- (U) Develop enhancements to GPS user equipment and system integration techniques to maximize position accuracy and jam resistance and exploit the benefits of GPS to improve offensive and defensive combat capabilities at reduced costs. ($282K)
- (U) Develop advanced very-high-reliability all-solid state navigation and reference technologies to provide for reduced life cycle costs and increased navigation system availability in both new system and retrofit applications. ($493K)

(U) FY 1995 Planned Program:
- (U) Develop advanced inertial reference technology and architecture to improve robustness of reference functions and weapon/sensor boresight accuracy. ($2,028K)
- (U) Develop short-range voice and low data rate jam resistant transmission capability to provide for cooperative low probability of detection (LPD) operations. ($1,842K)
- (U) Develop enhancements to GPS user equipment and system integration techniques to maximize position accuracy and jam resistance and exploit the benefits of GPS to improve offensive and defensive combat capabilities at reduced costs. ($1,650K)
- (U) Develop multi-user, medium to high capacity jam resistant airborne network to provide for LPD exchange between aircraft of time-critical threat, sensor, and cooperative operations information. ($2,214K)
- (U) Develop advanced very-high-reliability all-solid state navigation and reference technologies to provide for reduced life cycle costs and increased navigation system availability in both new system and retrofit applications. ($950K)

(U) Work Performed By: This program is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: TRW, San Diego, CA; Northrop, Hawthorne, CA; McDonnell Douglas, St. Louis, MO; Draper Laboratory, Cambridge, MA; and Lockheed, Fort Worth, TX.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0603109N, Integrated Electronic Warfare System.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603260F
Date: February 1994
PE Title: Intelligence Advanced Development
Budget Activity : #4 Demonstration & Validation (Dem/Val)
Old Budget Activity : #4 Tactical Programs

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3479 Advanced Sensor Exploitation								
1,511	693	890	1,063	1,113	1,443	1,502	Cont	TBD
3480 Automated Imagery Exploitation								
2,029	2,101	1,437	1,747	1,710	816	892	Cont	TBD
3481 Knowledge Based Technology for Intelligence								
2,135	1,792	1,575	1,671	1,635	2,119	2,206	Cont	TBD
3482 Scientific & Technical Intelligence Methodologies								
1,495	1,436	1,232	1,216	1,207	1,542	1,602	Cont	TBD
Total								
7,170	6,022	5,134	5,697	5,665	5,920	6,202	Cont	TBD

Program Element: #0603260F **Date: February 1994**
PE Title: Intelligence Advanced Development
Budget Activity : #4 Demonstration & Validation (Dem/Val)
Old Budget Activity : #4 Tactical Programs

B. (U) BRIEF DESCRIPTION OF ELEMENT: Develops and demonstrates advanced technology intelligence systems capabilities and techniques to support tactical and strategic commanders and National Command Authority needs for timely and all source intelligence information. IAD is composed of four software projects developed for the Air Force at Rome Labs (RL). IAD is in research category 6.4 because these projects expand and improve data storage, retrieval and handling capabilities; satisfy needs for near-real-time data processing, exploitation and dissemination from present and future advanced sensors. RL works directly with users, employing a rapid prototyping evolutionary approach, integrating finished modules directly into the field. The programs are oriented toward specific shortfalls and deficiencies as defined by the major commands (MAJCOMs), unified & specified commands, and intelligence organizations.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 3479, Advanced Sensor Exploitation (ASE): Correlates various sources of intelligence (COMINT, ELINT, and IMINT) within seconds as opposed to hours with current manual methods. Project includes development of data correlation and predictive intelligence algorithms, target analysis and prioritization, air order of battle update, and tactical analysis techniques. This computerized approach will speed up the correlation of data from diverse sources of intelligence information, including COMINT, ELINT, and IMINT, provide faster situational awareness and threat assessment and replace manual systems with automated capabilities.

(U) FY 1993 Accomplishments:
(U) - Complete Rapid Application of Air Power (RAAP) development directed towards a full-scale prototype including interfaces to the Intelligence Correlation Module (ICM) and Automated Planning System (APS). ($0.530)
(U) - Continued effort to expand the development of advanced correlation/fusion capabilities, incorporating components of ASE, RAAP, and other Rome Laboratory developments. ($0.597)
(U) - Completed effort to develop Electronic Footlocker (a rapid deployment package for intelligence in support of flying operations). ($0.384)

Program Element: #0603260F
PE Title: Intelligence Advanced Development
Budget Activity : #4 Demonstration & Validation (Dem/Val)
Old Budget Activity : #4 Tactical Programs

Date: February 1994

(U) FY 1994 Plans:
(U) - Complete effort to expand the development of advanced correlation/fusion capabilities. ($0.200)
(U) - Initiate an Analytical Tools for Targeting effort. This toolkit will include measures of effectiveness and damage criteria specification. ($0.493)

(U) FY 1995 Plans:
(U) - Continue Analytical Tools for Targeting development. ($0.485)
(U) - Initiate Consistent Operational Picture via Distributed Fusion development. ($0.405)

(U) Work Performed By: The program is managed by Air Force Material Command (AFMC), with project efforts conducted by Rome Labs, Griffiss AFB NY. The major contractors are: Synectics Corp., Fairfax VA; GTE, Mountain View CA; Delfin Systems, Sunnyvale CA; Harris Corporation, Melbourne FL; Sterling IMD, Inc., Rome NY; Eclectic Computing Concepts, Plano TX; PRC Inc., Bellevue NE; Hughes Aircraft, San Antonio TX; Systems Research and Applications, Arlington VA.

(U) Related Activities: IAD develops techniques, algorithms, software, and prototypes utilizing advanced technologies relating to various programs including:
(U) - Program Element #0102310F, NCMC TW/AA
(U) - Program Element #0207431F, Combat Air Intelligence Systems
(U) - Program Element #0207435F, Tactical Imagery Processing, Exploitation, and Dissemination
(U) - Program Element #0207438F, Theater Battle Management C3I
(U) - Program Element #0303152F, WWMCCS Information System
(U) - Program Element #0602702F, Command, Control, & Communications
(U) - Program Element #0603726F, C3I Subsystems Integration
(U) - Program Element #0604321F, Joint Tactical Fusion Program
(U) - Program Element #0604750F, Intelligence Equipment
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

Program Element: #0603260F
PE Title: Intelligence Advanced Development
Budget Activity : #4 Demonstration & Validation (Dem/Val)
Old Budget Activity : #4 Tactical Programs

Date: February 1994

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 3480, Automated Imagery Exploitation (AIE): This project develops the capability to more accurately and quickly interpret digital aerial photography by developing computer assisted techniques to manipulate and overlay imagery, cartographic data, SIGINT, and on-line intelligence data. The results of this effort will be more precise target locations and IDs, precise target reference scenes, and more accurate damage assessments; all developed for easily supportable, low cost commercially available computer workstations. The project will also develop data links which can be used to provide detailed imagery to theater and tactical units.

(U) FY '93 Accomplishments:
(U) - Completed IE2000 Testbed special applications programs. ($0.409)
(U) - Completed demonstrations of Electronic Footlocker techniques. ($0.343)
(U) - Developed techniques to provide timely SIGINT cueing techniques to support imagery exploitation. ($0.327)
(U) - Continued development of a receive/transmit capability for secondary imagery dissemination from many sources. ($0.450)
(U) - Continued development of Air Combat Command (ACC) intel network with open systems architecture to integrate imagery and intelligence data handling systems on the same network. ($0.500)

(U) FY 1994 Plans:
(U) - Complete development of a receive/transmit capability for secondary imagery dissemination. ($0.501)
(U) - Initiate IE2000 Configuration Management and Application development effort in support of ACC requirements. ($0.400)
(U) - Initiate Image Aim Point Graphic development effort in support of ACC requirements. ($0.500)
(U) - Initiate Mass Storage System and Lab effort in support of ACC requirements. ($0.700)

(U) FY 1995 Plans:
(U) - Continue IE2000 Configuration Management and Application development effort in support of imagery exploitation. ($0.237)
(U) - Continue Image Aim Point Graphic development effort in support of producing high quality target materials. ($0.300)
(U) - Continue Mass Storage development in support of ACC's Mass Digital Storage Concept. ($0.900)

Program Element: #0603260F **Date: February 1994**
PE Title: Intelligence Advanced Development
Budget Activity : #4 Demonstration & Validation (Dem/Val)
Old Budget Activity : #4 Tactical Programs

(U) Work Performed By: See Project 3479.

(U) Related Activities: See Project 3479.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3481, Knowledge Based Technology for Intelligence: This project will reduce manpower and warning times for respective STRATCOM, SPACECOM, and Air Intelligence Agency (AIA) intelligence data handling systems. The development of the analytical aids is based on artificial intelligence techniques. The increased timeliness, efficiency and effectiveness derived will provide warning time and accuracy, allowing national/military authorities a greater range of options to avert, diminish or control a crisis.

(U) FY 1993 Accomplishments:
(U) - Demonstrated Generic Message Parsing Expert System for Intelligence Data Processing. ($0.246)
(U) - Developed machine aided voice translator. ($0.529)
(U) - Transitioned the Intelligence Timeline Expert System to operational users. ($0.430)
(U) - Provided advanced analytical tools and databases for current intelligence analysis at AFSPACECOM. ($0.930)

(U) FY 1994 Plans:
(U) - Continue Selectively Improved Flagging Technique (SIFT) Expert System development in support of Electronic Warfare (EW) Flagging Mission. ($0.492)
(U) - Initiate Prototype Intelligence Event Builder which represents messages as icons on a timeline in support of multiple commands. ($0.300)
(U) - Initiate Tactical Intelligence for Air Combat in support of aircrew awareness in countering adversary air tactics. ($0.600)
(U) - Initiate Information Processor effort to transition hard-coded "stovepipe" message processing subsystems into open system, client/server environment. ($0.400)

Program Element: #0603260F **Date: February 1994**
PE Title: Intelligence Advanced Development
Budget Activity : #4 Demonstration & Validation (Dem/Val)
Old Budget Activity : #4 Tactical Programs

(U) FY 1995 Plans:
(U) - Continue development of EW Flagging Expert System. ($0.422)
(U) - Continue development of Prototype Intelligence Event Builder. ($0.353)
(U) - Continue development of Tactical Intelligence for Air Combat. ($0.400)
(U) - Continue development of open system architecture in support of message handling. ($0.400)

(U) Work Performed By: See Project 3479.

(U) Related Activities: See Project 3479.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 3482. Scientific and Technical Intelligence Methodologies: Conducts research on intelligence methodologies and develops operational employment simulation models for Air Force Foreign Aerospace Science Technology Center (FASTC) requirements. The technologies developed will help FASTC improve their analysis of current and future foreign weapons systems, and prevent technological surprise with regard to the capabilities of these systems.

(U) FY 1993 Accomplishments:
(U) - Developed automated tools to integrate and couple computer models between various branches at FASTC. ($0.249)
(U) - Completed the radar analysis assistant task. ($0.251)
(U) - Continued the development of the tool set to assist in the management of models and simulations. ($0.333)
(U) - Upgraded modeling capability of foreign aircraft. ($0.350)
(U) - Implemented effort on space employment simulation for FASTC to support analysis of space systems employment through simulation. ($0.312)

Program Element: #0603260F **Date:** February 1994
PE Title: Intelligence Advanced Development
Budget Activity : #4 Demonstration & Validation (Dem/Val)
Old Budget Activity : #4 Tactical Programs

(U) FY 1994 Plans:
(U) - Continue to develop techniques to process open source unformatted text. ($0.301)
(U) - Continue to develop Document Content Analysis and Retrieval System. ($0.499)
(U) - Continue to develop Advanced Intelligence (AI) Information System to support FASTC analysts. ($0.416)
(U) - Initiate AI Data Presentation efforts to develop an analyst workstation/inference engine. ($0.220)

(U) FY 1995 Plans:
(U) - Complete Advanced Intelligence (AI) Information System. ($0.620)
(U) - Continue to develop AI Data Presentation effort to develop an intelligent system to model foreign threats. ($0.612)

(U) Work Performed By: See Project 3479.

(U) Related Activities: See Project 3479.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603270F
PE Title. Electronic Combat (EC) Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2222 Expendable Countermeasures	7,015	4,413	4,634	3,662	4,326	4,550	3,478	Cont	TBD
2432 Defensive System Fusion	3,958	2,502	6,973	6,234	6,330	6,361	2,768	Cont	TBD
2754 Suppression of Enemy Defenses	1,530	3,006	1,970	2,174	3,881	3,593	3,148	Cont	TBD
431G Threat Alert	10,780	6,149	4,172	4,200	3,744	3,709	4,972	Cont	TBD
691X Onboard Countermeasures	7,375	7,381	9,951	9,790	7,643	5,998	5,192	Cont	TBD
Total	30,658	23,451	27,700	26,060	25,924	24,211	19,558	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program expands the EC technology base by proving design concepts and demonstrating technologies to support critical Air Force EC requirements. The projects are categorized by the development of components, subsystems, and technologies that have potential application to satisfy combat, special operations, and airlift EC requirements and to reduce acquisition and life cycle costs of EC systems. The program develops and demonstrates: radio frequency (RF); infrared (IR); electro-optical (EO); and command, control, and communications (C3) countermeasure technologies. Technology demonstrations include flyable brassboards against validated threat simulators. In addition, the program develops and demonstrates technologies and concepts for signature reduction, advanced electronic warfare (EW) transmitters, receivers, and power management. This program ensures a strong EC technology base to provide demonstrated counters to current and future threat capabilities.

Program Element: #0603270F
PE Title: Electronic Combat (EC) Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 0 MILLION IN FY 1995:

1. (U) Project 2222, Expendable Countermeasures: This project develops and demonstrates systems and components for infrared (IR), electro-optical (EO), laser, radio frequency (RF), and multi-spectral expendable countermeasure technologies. Improved antenna, transmitter, and multi-spectral and multi-technique offboard countermeasure technologies are developed and demonstrated.

   (U) FY 1993 Accomplishments:
   - (U) Continued development on the Multi-Spectral Expendables program. ($1,356K)
   - (U) Continued development on the Future Generation Expendables program. ($1,860K)
   - (U) Continued developing communication, navigation, identification (CNI) growth algorithms/testbed. ($2,002K)
   - (U) Completed IR search and track technology development effort. ($1,797K)

   (U) FY 1994 Planned Program:
   - (U) Continue developing the remaining portion of the Multi-Spectral Expendables program. ($985K)
   - (U) Continue development on the Future Generation Expendables program. ($1,088K)
   - (U) Continue developing CNI growth algorithms/testbed. ($2,340K)

   (U) FY 1995 Planned Program:
   - (U) Continue developing the remaining portion of the Multi-Spectral Expendables program. ($502K)
   - (U) Complete development on the Future Generation Expendables program. ($1,398K)
   - (U) Begin design and development on an advanced multi-spectral expendables risk reduction effort. ($368K)
   - (U) Complete development of CNI growth algorithms/testbed. ($2,366K)

   (U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH Major contractors are: Lockheed-Sanders, Nashua, NH; Raytheon, Goleta, CA; TRW, San Diego, CA; and Tracor, Austin, TX.

   (U) Related Activities:
   - (U) PE 0602204F, Aerospace Avionics.
   - (U) PE 0604270F, Electronic Warfare (EW) Development.
   - (U) PE 0604270N, EW Development.
   - (U) The Joint Director of Laboratories/Technical Panel on Electronic Warfare coordinates this effort with other Services. This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

   (U) Other Appropriation Funds: Not Applicable.

   (U) International Cooperative Agreements. Not Applicable.

Program Element: #0603270F
PE Title: Electronic Combat (EC) Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

2. (U) Project 2432, Defensive System Fusion: This project develops and demonstrates techniques and hardware technologies for sensor and system fusion and integration. It also develops architecture, algorithm, and assessment techniques. These technologies will cope with the projected multi-spectral threat and countermeasure environments for combat aircraft. This project develops advanced EC algorithms and expert software for application on existing and future EC systems. This project also conducts real-time person-in-the-loop and hardware-in-the-loop integrated defensive avionics demonstrations.

(U) FY 1993 Accomplishments:
- (U) Conducted initial and interim demonstrations, under the Advanced Defensive Avionics Response Strategy (ADARS) program, of fusion algorithms and software for achieving real-time intelligence into aircraft. ($2,161K)
- (U) Conducted initial demonstration of sorting and identification hardware, algorithms, and software. ($974K)
- (U) Integrated real-time mission simulation with specific simulators for future defensive avionics fusion demonstration. ($823K)

(U) FY 1994 Planned Program:
- (U) Conduct situation awareness technology program demonstrations. ($1,260K)
- (U) Conduct demonstrations using the Integrated Defensive Avionics Laboratory (IDAL) to demonstrate integrated electronic warfare (EW) sensors for situation awareness and countermeasures response strategy. ($1,232K)
- (U) Begin expanded situation awareness technology insertion effort to fuse onboard and offboard sensors. ($10K)

(U) FY 1995 Planned Program:
- (U) Complete situation awareness technology program testing and final demonstrations. ($1,182K)
- (U) Conduct continuing demonstrations using the IDAL showing benefit of integrating EW sensor suites for situation awareness and electronic attack (EA) response strategy. ($1,159K)
- (U) Continue expanded situation awareness technology insertion lab demonstration of onboard and offboard sensor fusion. ($4,632K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: ITT, Nutley, NJ; Loral, Yonkers, NY; and Lockheed Sanders, Nashua, NH.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0604270F, EW Development.
- (U) The Joint Director of Laboratories/Technical Panel on Electronic Warfare coordinates this effort with other Services. This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603270F
PE Title: Electronic Combat (EC) Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

3. (U) Project 2754, Suppression of Enemy Defenses: This project develops and demonstrates technologies and techniques for command and control warfare (C2W) (formerly called command, control, communications, and intelligence (C3I) warfare, or C3I countermeasures (CM)), standoff, and support CMs which deny, disrupt, and suppress adversary air defense operations. The project includes: 1) simulation efforts for evaluating new concepts and techniques; 2) components and techniques needed to jam enemy radar; 3) electronic collection systems to inform the field commander of changes in the electronic environment; and 4) advanced standoff jammer technology.

   (U) FY 1993 Accomplishments:
   - (U) Completed hardware/software demonstration of a workstation for in-house development of deceptive jamming techniques against hostile signals. ($273K)
   - (U) Conducted demonstration of a system to counter specific communication signals. ($1,257K)

   (U) FY 1994 Planned Program:
   - (U) Develop hardware to counter specific types of communication signals. ($1,325K)
   - (U) Design and develop an approach to deceive airborne navigation signals. ($1,681K)

   (U) FY 1995 Planned Program:
   - (U) Continue development of hardware to counter specific types of communication signals. ($292K)
   - (U) Continue development of an approach to deceive airborne navigation signals. ($1,656K)
   - (U) Begin design of hardware to reduce risk of C2W concepts. ($22K)

   (U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Raytheon, Goleta, CA; GTE, Mountain View, CA; Calspan, Buffalo, NY; Questech Inc., Fairfax, VA; and Georgia Tech Research Institute, Atlanta, GA.

   (U) Related Activities:
   - (U) PE 0602204F, Aerospace Avionics.
   - (U) The Joint Director of Laboratories/Technical Panel on Electronic Warfare coordinates this effort with other Services. This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

   (U) Other Appropriation Funds: Not Applicable.

   (U) International Cooperative Agreements: Not Applicable.

Program Element: #0603270F
PE Title: Electronic Combat (EC) Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

4. (U) Project 431G, Threat Alert: This project develops and demonstrates advanced technologies for threat warning to enhance aircraft survivability and provide air crew situation awareness. Missile/aircraft warning, laser warning, and radio frequency (RF) receiver technologies are developed and demonstrated under this project. The project also develops and demonstrates advanced EC preprocessor technologies, advanced sorting and preprocessing algorithms, and expert software for applications on existing and future EC systems.

(U) FY 1993 Accomplishments:
- (U) Conducted tests and developed equipment to reduce the risk for developing laser and infrared (IR) warning systems. ($3,265K)
- (U) Fabricated a single aperture antenna to measure angle-of-arrival of radar emitters. ($1,495K)
- (U) Demonstrated, in the lab, advanced preprocessing radar warning hardware and algorithms. ($3,038K)
- (U) Continued risk reduction for advanced radar warning concepts and techniques ($2,982K)

(U) FY 1994 Planned Program:
- (U) Continue developing equipment and approaches to reduce risk for infrared warning systems development. ($3,621K)
- (U) Complete test and demonstration of single aperture antenna to measure angle-of-arrival of radar emitters. ($972K)
- (U) Complete demonstration of advanced preprocessing radar warning hardware and algorithms. ($1,086K)
- (U) Continue risk reduction for advanced radar warning concepts and techniques. ($470K)

(U) FY 1995 Planned Program:
- (U) Continue developing equipment and approaches to reduce risk for infrared warning systems development. ($3,622K)
- (U) Continue risk reduction for advanced radar warning concepts and techniques. ($550K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: Loral, Yonkers, NY, and Lexington, MA; CECO, Cincinnati, OH; Lockheed Sanders, Nashua, NH; Nichols Research Corp., Wakefield, MA; and TRW MEAD, San Diego, CA.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0604270F, Electronic Warfare (EW) Development
- (U) PE 0604270N, EW Development.
- (U) The Joint Director of Laboratories/Technical Panel on Electronic Warfare coordinates this effort with other Services. This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603270F
PE Title: Electronic Combat (EC) Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

5. (U) Project 691X, Onboard Countermeasures: This project develops and demonstrates infrared (IR), electro-optical (EO), laser, and radio frequency (RF) countermeasure (CM) technologies for onboard application to combat aircraft.

(U) FY 1993 Accomplishments:
- (U) Continued experiments for risk reduction of a laser-based CM system to defeat threat IR missiles. ($5,462K)
- (U) Conducted live fire testing of new techniques to counter advanced threat missiles ($485K)
- (U) Developed techniques for updating current systems to counter advanced radars. ($1,173K)
- (U) Continued development/tests to counter threat laser beamriders and laser-aided weapon systems. ($255K)

(U) FY 1994 Planned Program:
- (U) Continue experiments, including beginning development of IRCM acquisition techniques, for risk reduction of a laser-based CM system to defeat threat IR missiles. ($6,665K)
- (U) Complete live fire testing of new techniques to counter advanced threat missiles. ($255K)
- (U) Continue development/tests to counter threat laser beamriders and laser-aided weapon systems. ($461K)

(U) FY 1995 Planned Program:
- (U) Continue experiments for risk reduction of a laser-based CM system to defeat threat IR missiles, including development of an IR aperture for conformal aircraft installation and increased affordability. ($9,401K)
- (U) Continue development to counter threat laser beamriders and laser-aided weapon systems. ($550K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. Major contractors are: SAIC, Dayton, OH; Lockheed Sanders, Nashua, NH; Martin Marietta Corp., Denver, CO; and Laser Power Corp., San Diego, CA.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0604270F, Electronic Warfare (EW) Development.
- (U) PE 0604270N, EW Development.
- (U) PE 0603203F, Avionics for Aerospace Vehicles.
- (U) The Joint Director of Laboratories/Technical Panel on Electronic Warfare coordinates this effort with other Services. This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603302F
PE Title: Space and Missile Rocket Propulsion
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
6340 Space Systems Propulsion Technology	7,796	7,430	6,490	8,261	7,634	6,973	6,928	Cont	TBD
6341 Missile Systems Propulsion Technology	3,089	4,297	5,310	5,414	5,275	4,138	4,380	Cont	TBD
Total	10,885	11,727	11,800	13,675	12,909	11,111	11,308	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program demonstrates advanced rocket propulsion technology. This program is the key technology step to transition the most promising rocket propulsion technologies developed and demonstrate them in applications using full-scale, proof-of-principle demonstrations. Solid propellant technology with higher performance than current propellants and environmentally acceptable exhaust products, manufactured using environmentally sensitive processes, is under development. Technology which will reduce the manufacturing cost of nozzles by 20 percent is also under development. Anticipated technology advances in this program are a 100 percent increase in payload capability from low earth orbit (LEO) to geosynchronous earth orbit (GEO), a $100 million savings in space launch, and liquid engines which can be used 50 times before being rebuilt. Technologies demonstrated under this program may be applied to all DoD and NASA propulsion needs. The propulsion industry also leverages the technologies from this program to enhance the country's rocket propulsion industry competitiveness. These projects support the Integrated High Performance Rocket Propulsion Technology (IHPRT) program goals.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 6340, Space Systems Propulsion Technology: This project demonstrates advanced and innovative storable liquid, cryogenic liquid, and electric arcjet propulsion systems for current and future national space systems. Launch vehicle, orbit maneuvering and transfer, and satellite station keeping applications are the focus of the technology developed under this project. The emphasis is on space propulsion system affordability, reliability, reusability, reduced weight, reduced operation and launch costs, and increased life and performance.

(U) FY 1993 Accomplishments:
- (U) Continued orbit transfer and manuevering technology demonstration. ($4,745K)
- (U) Continued development of space launch liquid propulsion technologies for existing and future launch vehicles. ($3,051K)

Program Element: #0603302F
PE Title: Space and Missile Rocket Propulsion
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Continue orbit transfer and manuevering technology demonstration. ($7,191K)
- (U) Continue development of space launch liquid propulsion technologies for existing and future launch vehicles. ($239K)

(U) FY 1995 Planned Program:
- (U) Continue orbit transfer and manuevering technology demonstration. ($820K)
- (U) Continue development of space launch liquid propulsion technologies for existing and future launch vehicles. ($5,670K)

(U) Work Performed By: This program is managed by the Phillips Laboratory, Edwards AFB, CA. The contractors are: Aerojet Propulsion, Sacramento, CA, Allied Signal Aerospace, Tempe, AZ; Pratt and Whitney, West Palm Beach, FL; Rockwell Rocketdyne, Canoga Park, CA; and TRW Missile Systems, Redondo Beach, CA.

(U) Related Activities:
(U) PE 0602601F, Phillips Laboratory.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 6344: Missile Systems Propulsion Technology: This project develops innovative and advanced solid propulsion systems for tactical and ballistic missile applications. The emphasis of this project is environmental acceptability, as well as reducing the development and fabrication costs of future missile propulsion systems and increasing the reliability and life of these systems.

(U) FY 1993 Accomplishments:
- (U) Continued technology development of advanced, environmentally acceptable solid propellants for current and future missile systems. ($1,100K)
- (U) Continued technology development of components for solid boosters necessary to incorporate environmentally acceptable propellant. ($1,989K)

(U) FY 1994 Planned Program:
- (U) Continue technology development of advanced, environmentally acceptable solid propellants for current and future missile systems. ($4,197K)

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Program Element: #0603302F
PE Title: Space and Missile Rocket Propulsion
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) Continue technology development of components for solid boosters necessary to incorporate environmentally acceptable propellant. ($100K)

(U) FY 1995 Planned Program:
- (U) Continue technology development of advanced, environmentally acceptable solid propellants for current and future missile systems. ($3,913K)
- (U) Continue technology development of components for solid boosters necessary to incorporate environmentally acceptable propellant. ($1,397K)

(U) Work Performed By: This program is managed by the Phillips Laboratory, Edwards AFB, CA. The contractors are Atlantic Research Corp., Gainsville, VA; Chemical Systems Division, San Jose, CA; GenCorp Aerojet Propulsion, Sacramento, CA; Hercules ABL, Rocket Center, WV; and, Thiokol Corp, Ogden, UT.

(U) Related Activities:
- (U) PE 0602601F, Phillips Laboratory.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603307F
PE Title: Air Base Operability Advanced Development
Budget Activity: #4 - Demonstration/Validation
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

A. (U) RESOURCES ($ In Thousands):

FY 93 Actual	FY 94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3018 Air Base Operability								
3,520	3,701	2,312	1,734	1,524	1,489	2,712	CONT	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program performs demonstration/validation for projects in Air Base Operability (ABO). The Air Force must provide people, aircraft, facilities, and key supporting systems so that theater air bases can continue to operate following enemy attacks allowing air power to be continuously and effectively employed throughout the conflict.

C. (U) JUSTIFICATION FOR PROJECT LESS THAN $10.0 MILLION IN FY 1995:

(U) Project 3018 Air Base Operability (ABO): Provides Advanced Development efforts for active and passive defense, air base survivability, base recovery, and sortie generation. It also funds the continuing integration, planning, and technology demonstration activities of the ABO Systems Program Office (SPO). The SPO is responsible for integrating all ABO activities Air Force wide and performing cost effectiveness analyses on ABO requirements and programs for meeting them.

(U) FY 1993 Accomplishments:
(U) - Continued aircraft shelter validation analysis and testing. ($313K) (Jun 93)
(U) - Continued integration of subsystems for the Mobile Ordnance Disrupter System (MODS). ($627K) (Aug 93)
(U) - Conducted full scale mitigation validation testing of the efforts to improve Survivability of Structures on Piles. Continued

Program Element: #0603307F
PE Title: Air Base Operability, Advanced Development
Budget Activity: #4 - Demonstration/Validation
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

modeling analysis to assess damage probability. ($839) (Aug 93)
(U) - Completed test planning for Scatterable Submunition Clearance. ($153K) (Jul 93)
(U) - Published Camouflage, Concealment and Deception (CCD) manuals. ($57K) (Jul 93)
(U) - Continued support of Foreign Aerospace Science Technology Center (FASTC) Threat Compendium. ($42K) (Continuous)
(U) - Started support of annual CCD Smoke Week project. ($47K) (Aug 93)
(U) - Initiated Dem/Val on Ground Jammer program. ($276K) (Apr 93)
(U) - Continued Dem/Val on Aircraft Decoys. ($128K) (Sep 93)
(U) - Started Dem/Val of Explosive Hazard Reduction (EHR) munitions site surveys. ($623K) (Jul 93)
(U) - Started Dem/Val of EHR munitions storage module. ($415K) (Feb 93)

(U) FY 1994 Plans:
(U) - Award Dem/Val contract for a Scatterable Submunition Clearance system. ($502K) (1QFY94)
(U) - Award Dem/Val contract for the Armored Multi-Role Vehicle (ARMRV). ($861K) (2QFY94)
(U) - Continue support of FASTC Threat Compendium. ($32K) (Continuous)
(U) - Initiate and complete Dem/Val of Vertical smoke and Obscurants. ($120K) (3QFY94)
(U) - Complete Dem/Val on Survivability of Structures Founded on Piles. ($110K) (3QFY94)
(U) - Begin CCD Multi-Spectral Study. ($110K) (3QFY95)
(U) - Continue EHR Munitions Site Surveys. ($608K) (Complete 4QFY94)
(U) - Complete Aircraft Shelter Upgrade. ($528K) (4QFY94)
(U) - Complete Dem/Val of Multi-spectral Nets. ($187K) (1QFY94)
(U) - Continue Air Force involvement/analysis of CCD Smoke Week Project. ($64K) (Continuous)
(U) - Award Dem/Val contract for CCD Laser Warning/Laser Defeat ($184K) and CCD Speed Trap. ($64K) (1QFY94)
(U) - Continue Dem/Val on CCD Ground Jammer Program. ($219K) (4QFY96)
(U) - Complete Dem/Val on EHR Munitions Storage Module. ($112K) (1QFY94)

Program Element: #0603307F **Date:** February 1994
PE Title: Air Base Operability, Advanced Development
Budget Activity: #4 - Demonstration/Validation
Old Budget Activity: #4 - Tactical Programs

(U) FY 1995 Plans:
- (U) - Continue support of FASTC Threat Compendium. ($33K) (Continuous)
- (U) - Continue test/analysis of a Scatterable Submunition Clearance system. ($689K) (1QFY95)
- (U) - Update the CCD Manual. ($79K) (1QFY95)
- (U) - Complete Dem/Val of the ARMRV. ($789K) (1QFY95)
- (U) - Continue Dem/Val on Ground Jammer Program ($175K) (4QFY95)
- (U) - Continue Air Force involvement/analysis of CCD Smoke Week Project. ($53K)(Continuous)
- (U) - Continue Dem/Val for Laser Warning/Laser Defeat. ($494K) (4QFY96)

(U) Program to Completion: N/A, continuing program.

(U) Work Performed By: Sparta, Inc., Huntsville AL and Sverdrup Technology, Eglin AFB FL. In-house development by Aeronautical Systems Center and Armstrong Laboratory, Wright-Patterson AFB OH; Air Force Weapons Laboratory and Phillips Laboratory, Kirtland AFB NM; and Aeronautical Systems Center, Eglin AFB FL.

(U) Related Activities:
(U) - Program Element 0604617F Air Base Operability.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603308F
PE Title: Strategic Missile Modernization
Budget Activity : #4 Demonstration & Validation
Old Budget Activity : Not Applicable

Date: February 1994

A: (U) RESOURCES ($ in Thousands): Note: All programs below are new starts in FY95 except Reentry System Launch Program.

	FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
1020	ICBM Guidance Applications								
	0	0	12,650	22,593	21,593	23,242	24,319	TBD	TBD
1021	ICBM Propulsion Applications								
	0	0	301	604	0	0	0	TBD	TBD
1022	ICBM Reentry Vehicle Applications								
	0	0	10,939	1,423	703	611	0	TBD	TBD
1023	Reentry System Launch Program								
	*0	**0	11,827	12,878	11,256	11,466	12,438	Cont	TBD
1024	ICBM Command & Control Applications								
	0	0	301	811	503	307	0	TBD	TBD
Total									
	0	0	36,018	38,309	34,055	35,626	36,757	TBD	TBD

* FY 93 funds in PE 0101213F, Minuteman Squadrons.
** FY 94 funds in PE 0305119F, Medium Launch Vehicles.

Program Element: 0603308F **Date:** February 1994
PE Title: Strategic Missile Modernization
Budget Activity : #4 - Demonstration & Validation
Old Budget Activity: Not Applicable

B. (U) BRIEF DESCRIPTION OF ELEMENT: Efforts identify methods to reduce life cycle costs, improve nuclear safety and surety, support international arms control agreements, and ensure Minuteman III supportability to the year 2020. Program includes demonstration and validation of Minuteman III guidance options, independent assessment of stage IV supportability, feasibility study of future warhead safety options, and enhancements to survivable command and control capabilities. These programs are in research category 6.4, Demonstration and Validation. These programs integrate existing technologies and reduce life cycle costs.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) 1021, ICBM Propulsion Applications: The Minuteman III stage IV propulsion system rocket engine (PSRE) is out of production and is the most significant component in limited supply. Should additional Minuteman III test or alert missiles be required, additional PSREs, or an alternate capability, will be needed. Additional PSREs may be required to support changes to JCS test guidelines, unanticipated operational test problems, or increased testing to support the guidance replacement, propulsion replacement, and/or single reentry vehicle programs. The ICBM Propulsion Applications program will identify current PSRE capability, examine low cost alternatives, and document cost and technical risks.

(U) FY 1993 Accomplishments: Not applicable.

(U) FY 1994 Plans: Not applicable.

(U) FY 1995 Plans: New start.
(U)- Initiate independent assessment of PSRE and study options to meet Minuteman III stage IV requirements. ($104)
(U)- Conduct fired PSRE reuse study. ($197)

(U) Work Performed By: TBD.

(U) Related Activities:
(U)- There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: 0603308F
PE Title: Strategic Missile Modernization
Budget Activity : #4 - Demonstration & Validation
Old Budget Activity: Not Applicable

Date: February 1994

(U) Other Appropriation Funds ($ In Thousands): Not Applicable.

(U) International Cooperative Agreement: Not Applicable.

(U) 1024. ICBM Command and Control Applications: The deMIRVing of ICBMs and overall cuts in the number of nuclear weapons reduce the incentive to attack individual ICBM silos. Therefore, the incentive to attack Minuteman launch control centers will increase unless steps are taken to lessen an aggressor's confidence in being able to prevent missile launch by simultaneously destroying all launch control centers. This program funds efforts to identify existing technologies (Ground Launch Cruise Missile, Small ICBM, Airborne Launch Control Centers, etc.) to increase the uncertainty of destroying Minuteman launch control centers. The use of inter-squadron relay of launch commands, ground deployable UHF repeaters for airborne launch control center commands, and alternative launch command nodes will be examined. The identification and use of existing military hardware, software, and system designs/documentation are principal concerns. Testing existing low-cost technology (fiber optic cable, telescoping antennas, etc.) under a generation scenario will be stressed. Methods to allow further disengagement and cost savings will be pursued.

(U) FY 1993 Accomplishments: Not applicable.

(U) FY 1994 Plans: Not applicable.

(U) FY 1995 Plans: New start.
(U)- Examine feasibility of using UHF repeaters and inter-squadron relay of critical commands. ($301)

(U) Work Performed By: TBD

(U) Related Activities:
(U)- There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands): Not Applicable.

(U) International Cooperative Agreement: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603308F
PE Title: Strategic Missile Modernization
Project Number: 1020
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity: Not Applicable
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
ICBM Guidance Applications								
0	0	12,650	22,593	21,593	23,242	24,319	TBD	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: ICBM Guidance Application efforts implement the JROC-validated Mission Need Statement for Future Guidance Systems for Intercontinental Ballistic Missiles. The program is a compilation of government and contractor efforts focused on implementing disengagement strategies as directed by national security planning agencies, significantly reducing guidance system life cycle cost, increasing nuclear surety, and evaluating/demonstrating the advanced inertial measurement unit (IMU) and guidance options that will keep the Minuteman III viable through the year 2020. This program is important to the preservation of the ballistic missile guidance industrial base. ICBM Guidance Applications is in research category 6.4, Demonstration and Validation. Guidance Applications projects will demonstrate the utility and/or cost reduction potential of technologies applied to the Minuteman III guidance system.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program: Not applicable.

2. (U) FY 1994 Planned Program: Not applicable.

Program Element: #0603308F
PE Title: Strategic Missile Modernization
Project Number: 1020
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity: Not Applicable
Date: February 1994

3. (U) FY 1995 Planned Program: FY95 New Start.

   (U) - Support the Advanced Inertial Measurement System (AIMS) program through the completion of demonstration and validation of brassboard testing. ($10,000)
   (U) - Perform Cost and Operational Effectiveness Analysis (COEA). ($1,000)
   (U) - Perform Reliability Analysis Study of NS20 IMU viability for dormant operations including start-up reliability. ($800)
   (U) - Guidance Replacement Program (GRP) Phase 1 contractor support to evaluate integration of alternative advanced IMUs with GRP Phase 1 hardware and software. ($850)

4. (U) Program to Completion: (TBD)
   (U) - GRP Phase 1 contractor support to assist advanced IMU integration with Minuteman III GRP Phase 1. ($4,600)
   (U) - Support and in-house systems engineering support. (TBD)
   (U) - In FY95, the Defense Acquisition Board (DAB) will determine the best option to meet the requirements of the Future Guidance Systems for Intercontinental Ballistic Missiles Mission Need Statement. If the AIMS is selected, Engineering and Manufacturing Development (EMD) could begin as early as FY95. Guidance Applications funds would be used to offset GRP Phase 2 EMD costs. If an alternative EMD schedule is directed (other than FY95 start), or other advanced IMU concept(s) are selected by the DAB, the EMD program will be tailored as necessary. (TBD)

D. (U) WORK PERFORMED BY: Litton/Hughes/Northrop, Woodland Hills, CA and Martin Marietta/Honeywell, Pitsfield, MA, will perform the AIMS-related work. Other contractor(s) may be selected or required depending on the DAB selected option(s) to meet the requirements of the Mission Need Statement. Support for integration of AIMS with the Minuteman III will be provided by the GRP Phase 1 contractor, Rockwell International, Anaheim, CA. Inertial instruments technical support will be provided by Charles Stark Draper Lab and systems engineering support from TRW, San Bernadino, CA and Ogden, UT.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

Program Element: #0603308F
PE Title: Strategic Missile Modernization
Project Number: 1020
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity: Not Applicable
Date: February 1994

G. (U) RELATED ACTIVITIES: The Minuteman III Guidance Replacement Program (GRP) Phase 1 replaces 1960's guidance electronics with modern, supportable electronics. The GRP Phase 1 design will accommodate incorporation of the Phase 2 upgrades such as a new inertial measurement unit (IMU).

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: TBD.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603308F
PE Title: Strategic Missile Modernization
Project Number: 1022
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity: Not Applicable
Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
ICBM Reentry Vehicle Applications								
0	0	10,939	1,423	703	611	0	TBD	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project will address two initiatives to support current reentry systems. First, the project supports implementation of an OSD directed joint Air Force/Navy Reentry Vehicle (RV) Industrial Base Sustainment Program. The program will provide a continuing industrial base to support critical ballistic missile reentry system technology. Tasks will ensure availability of technical capability needed to protect and maintain critical and unique industrial base attributes necessary for the in-service support of ICBM reentry systems. This program will integrate Air Force and Navy requirements into a comprehensive program. Close coordination will also be maintained with the DoD Science and Technology community to leverage existing technology and preclude duplication of effort. The second facet of this project is focused on conducting tasks necessary to support Minuteman III reentry vehicles which do not fall under the purview of the joint Air Force/Navy program described above. Both of the above project initiatives will integrate technologies necessary to enhance existing warhead safety and address in-service reentry vehicle supportability. These efforts are driven by force structure guidance dictating a Minuteman III force of 500 missiles, arms control treaties/initiatives directing the Minuteman III force be downloaded to a single reentry vehicle configuration, and interest in deploying a warhead with state-of-the-art safety features. All are necessary to sustain the Minuteman III to at least 2020 as the only remaining land-based ICBM. ICBM Reentry Vehicle Applications is in research category 6.4, Demonstration and Validation. This project will integrate existing RV technology and reduce life cycle costs.

Program Element: 0603308F
PE Title: Strategic Missile Modernization
Project Number: 1022
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity: Not Applicable
Date: February 1994

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   (U) - Not applicable.

2. (U) FY 1994 Planned Program:
   (U) - Not applicable.

3. (U) FY 1995 Planned Program: New start.

   (U) RV Industrial Base Sustainment Efforts:
   - (U) - Identify and assess those critical attributes necessary to maintain the ICBM unique RV industrial base capability and integrate with Navy requirements to develop comprehensive requirements. ($2,500)
   - (U) - Conduct RV/fuze functional performance assessment and investigate improved assessment methods. ($900)
   - (U) - Conduct trade studies on options for enhancing weapon system performance accuracy assessment using current technology on-board sensors. ($1,100)
   - (U) - Evaluate RV range limitations and determine options for extension. ($1,400)
   - (U) - Conduct feasibility study and preliminary design trades of Mk 21 and other warhead alternatives. ($3,000)
   - (U) - Conduct assessment of RV aging factors and identify alternatives for enhancing support for RV life extension/sustainment. ($2,039)

4. (U) Program to Completion:
   - (U) - Conduct an independent assessment of weapon capabilities against a range of targets consistent with the National Target Base. (TBD)
   - (U) - Conduct study and assessment of additional warhead options. (TBD)
   - (U) - Develop service life estimates for ICBM RVs. (TBD)

D. (U) WORK PERFORMED BY: TBD.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: Not Applicable.

Program Element: 0603308F
PE Title: Strategic Missile Modernization
Project Number: 1022
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity: Not Applicable
Date: February 1994

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.

F. PROGRAM DOCUMENTATION: Not Applicable.

G. RELATED ACTIVITIES:
- (U) This project includes Air Force resources which will support the joint Air Force/Navy Reentry Vehicle Industrial Base Sustainment Program. The Joint Reentry Vehicle Industrial Base Sustainment Program Office will integrate Air Force and Navy requirements into a comprehensive program and maintain close coordination with service and national laboratory technology programs to ensure there is no duplication of effort.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: TBD.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: # 0603308F
PE Title: Strategic Missile Modernization

Project: 1023 **Date:** February 1994
Budget Activity: #4 Demonstration and Validation
Old Budget Activity: #3 Strategic Programs

A. (U) RESOURCES ($ in Thousands)

FY 1993 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Reentry Systems Launch Program (RSLP)								
*0	**0	11,827	12,878	11,256	11,466	12,438	Cont	TBD

* FY93 and prior funding was in PE 0101213F, Minuteman Squadrons.
** FY94 funding is in PE 0305119F, Medium Launch Vehicles.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Reentry Systems Launch Program (RSLP) is the single agency tasked to provide Research, Development, Test and Evaluation (RDT&E) launch vehicle support to DoD and other government agencies. RSLP was established by the Secretary of Defense in 1972. It provides mission planning, payload integration, launch support, booster storage and disposal, maintenance and logistics support for DoD RDT&E launches. Costs directly attributable to a specific launch or program are paid by the users (Air Force, Navy, Army, Ballistic Missile Defense Organization, etc.). RSLP directly supports deactivation of Minuteman II by providing storage of these and other assets as well as continued development of the Multiservice Launch System (MSLS). MSLS will provide a cost-effective modular front section, including guidance system, payload deck, and attitude control system, for retired Minuteman missiles. RSLP is in research category 6.4, Demonstration and Validation. RSLP performs demonstration and validation activities associated with launch capabilities.

Program Element: # 0603308F
PE Title: Strategic Missile Modernization
Project: 1023
Date: February 1994
Budget Activity: #4 Demonstration and Validation
Old Budget Activity: #3 Strategic Programs

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:*
   - (U) - Researched test launch vehicle configurations; developed, acquired, stored and maintained test launch vehicles, motors, components, and facilities in support of projected governmental user requirements. ($1,400)
   - (U) - Provided storage for deactivated Minuteman II missiles and other missile flight test assets. ($3,120)
   - (U) - Continued Multiservice Launch System (MSLS) development. ($4,000)
   - (U) - Provided launch assets and technical assistance for all DoD RDT&E launches. (Funded by Users)

2. (U) FY 1994 Planned Program:**
   - (U) - Research test launch vehicle configurations; develop, acquire, store and maintain test launch vehicles, motors, components, and facilities in support of projected governmental user requirements. ($5,200)
   - (U) - Provide storage for deactivated Minuteman II missiles and other missile flight test assets. ($6,136)
   - (U) - Continue MSLS development. ($5,000)
   - (U) - Provide launch assets and technical assistance for all DoD RDT&E launches. (Funded by Users)

3. (U) FY 1995 Planned Program:
   - (U) - Research test launch vehicle configurations; develop, acquire, store and maintain test launch vehicles, motors, components, facilities and capabilities in support of projected governmental user requirements. ($3,869)
   - (U) - Provide necessary storage requirements for deactivated Minuteman II and other missile flight test assets. ($4,958)
   - (U) - Continue MSLS development. ($3,000)
   - (U) - Provide launch assets and technical assistance for all DoD RDT&E launches. (Funded by Users)

4. (U) Program to Completion:
   - (U) - RSLP is a continuing program.

* FY93 and prior funding was in PE 0101213F, Minuteman Squadrons.
** FY94 funding is in PE 0305119F, Medium Launch Vehicles.

Program Element: #0603308F
PE Title: Strategic Missile Modernization
Project: 1023 **Date:** February 1994
Budget Activity: #4 Demonstration and Validation
Old Budget Activity: #3 Strategic Programs

D. (U) WORK PERFORMED BY: Martin-Marietta, Denver, CO, is the Multiservice Launch Systems (MSLS) contractor. MSLS provides a cost-effective modular front section, including off-the-shelf guidance and control, telemetry and launch services to accommodate a variety of DoD mission requirements. Boeing provides facility maintenance and silo launches of Minuteman ICBMs with the original weapon system guidance and launch support equipment. Orbital Sciences (Space Data Division) provides the ICBM "front section," payload deployment system, sounding rocket hardware integration and launch services. TRW provides systems engineering and targeting support. Rockwell (Autonetics) provides guidance and control technical support. Pueblo Army Depot will assist with temporary storage of Minuteman II second and third stages until Navajo modifications are complete.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.

2. (U) SCHEDULE CHANGES: Not Applicable.

3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: Not Applicable.

G. (U) RELATED ACTIVITIES:
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: # 0603308F
PE Title: Strategic Missile Modernization
Project: 1023
Date: February 1994
Budget Activity: #4 Demonstration and Validation
Old Budget Activity: #3 Strategic Programs

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY 1993 Actual	FY 1994 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3300, MILCON (for Minuteman II storage), Budget Activity: 4, Program Title: Reentry Systems Launch Program								
*3,900	**7,250	0	0	0	0	0	0	16,150

* FY93 and prior funding was in PE 0101213F, Minuteman Squadrons.
** FY94 funding is in PE 0305119F, Medium Launch Vehicles.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603311F
PE Title: Ballistic Missile Technology (BMT)
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
4091 Missile Electronics	54,036	19,889	4,900	5,259	10,538	10,691	8,739	Cont	TBD
4092 Reentry Vehicle Technology	3,487	895	5,100	5,000	5,000	5,000	5,000	Cont	TBD
4093 Propulsion and Booster Technology	1,688	0	0	0	0	0	0	Cont	TBD
Total	59,211	20,784	10,000	10,259	15,538	15,691	13,739	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program demonstrates ballistic missile technologies in the areas of guidance and control, and reentry vehicles for existing and future intercontinental ballistic missiles (ICBM) systems and subsystems. The end of the Cold War, decline of the Soviet threat, and strong interest in precision strike missions for Global Reach/Global Power have resulted in considerable reorientation of this program. Near-term emphasis is on technologies which provide low-cost, low-maintenance, increased reliability, and increased performance of the currently deployed ICBM fleet. This will enable it to continue operations well beyond the original design life. Demonstration of integrated technologies is essential to verify real world benefits/payoffs of the integrated system and to reduce technology transition risk. Through BMT, the Air Force coordinates ICBM research and development in various laboratories, performs technology trade offs, develops brassboard hardware, and conducts ground and flight testing. The BMT program maintains technological superiority, thereby, maintaining U.S. security options within a changing global environment.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 4091, Missile Electronics: The current focus of the Missile Electronics project is to develop and demonstrate technologies which dramatically reduce acquisition and support costs of advanced guidance for existing and future ICBMs while maintaining present day accuracies. This project investigates and persues technologies to improve the guidance, electronics, and power subsystems of existing and future missiles, and leverages ongoing advanced tactical precision navigation projects to extend their capabilities to support Global Reach/Global Power.

Program Element: #0603311F
PE Title: Ballistic Missile Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed fabrication and performance testing of Advanced Inertial Measurement System engineering test units and began fabrication of flight quality units for FY 1994 delivery and tests. ($52,200K)
- (U) Continued design and development of joint Air Force/ARPA Global Positioning System (GPS) Guidance Package brassboard flight test units. ($1,836K)

(U) FY 1994 Planned Program:
- (U) Continue development of advanced boost guidance technology to reduce current operations costs and improve reliability and maintainability of existing systems. ($19,889K)

(U) FY 1995 Planned Program:
- (U) Continue development of advanced boost guidance technology to reduce current operations costs and improve reliability and maintainability of existing systems. ($1,000K)
- (U) Develop advanced precision navigation technology incorporating GPS to support Global Reach/Global Power. ($3,900K)

(U) Work Performed By: This project is managed by Phillips Laboratory, Kirtland AFB, NM. The major contractors are: GM Hughes Electronics Division, El Segundo, CA; Litton Guidance and Control Systems, Woodland Hills, CA; Honeywell Inc., Clearwater, FL; Rockwell International, Autonetics Division, Anaheim, CA; and Martin Marietta Corp, Pittsfield, MA.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 4092, Reentry Vehicle Technology: This project develops reentry phenomenology technology, global range precision strike technologies, and technologies for penetration of a reentry vehicle through enemy defenses. Reentry phenomenology technology involves understanding the ionized plasma sheath around a reentry vehicle, ablative material needs, and aerodynamic performance characteristics. Reentry vehicle technologies for Global Reach/Global Power include reentry plasma effects, materials, and vehicle performance over extended aerodynamic glide trajectories. Defense penetration technology is a low level effort to analyze penetration tactics and options for defeating current and projected anti-ballistic missile threats.

Program Element: #0603311F
PE Title: Ballistic Missile Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Conducted analysis and engineering design trades to identify key technology challenges for alternative uses of ballistic missiles. ($1,000K)
- (U) Completed pyrotechnic flight test analysis on optical penetration aids flight. ($2,487K)

(U) FY 1994 Planned Program:
- (U) Analyze penetration tactics and options for defeating current and projected anti-ballistic missile threats. ($200K)
- (U) Develop reentry vehicle phenomenology to support Global Reach/Global Power. ($695K)

(U) FY 1995 Planned Program:
- (U) Continue analyzing penetration tactics and options for defeating current and projected anti-ballistic missile threats. ($100K)
- (U) Continue development of reentry vehicle phenomenology to support Global Reach/Global Power. ($5,000K)

(U) Work Performed By: This project is managed by Phillips Laboratory, Kirtland AFB, NM. The major contractors are: SAIC, Ft. Washington, PA; Sparta, San Bernardino, CA; Martin Marietta Corp, Valley Forge, PA; Hypersonics, Sunnyvale, CA; and Orbital Science Corp, Chandler, AZ.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602201F, Flight Dynamics.
- (U) PE 0602203F, Aerospace Propulsion and Power.
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0602601F, Phillips Laboratory.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 4093, Propulsion and Booster Technology: This project integrates missile and propulsion technologies for existing and future intercontinental ballistic missiles (ICBMs) to optimize systems performance. It will demonstrate rocket propulsion technologies to extend performance, enhance producibility, increase reliability, and lower cost of advanced ICBMs.

Program Element: #0603311F
PE Title: Ballistic Missile Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Formulated and conducted sub-scale tests on a more energetic, environmentally safe, reduced hydrochloric acid emitting propellant which approaches the performance levels of current ballistic missile formulations. ($1,000K)
- (U) Manufactured and tested second 37-inch motor using the more energetic, clean propellant formulation, demonstrating a scale-up capability, and establishing the performance baseline in operational class rocket motors. ($688K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This project is managed by Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Thiokol Corporation, Brigham City, UT; Hercules Inc., Magna, UT; Aerojet Propulsion Company, Sacramento, CA; Chemical Systems Division, San Jose, CA; and Rockwell/Rocketdyne Division, Canoga Park, CA.

(U) Related Activities:
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603302F, Space and Missile Rocket Propulsion.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

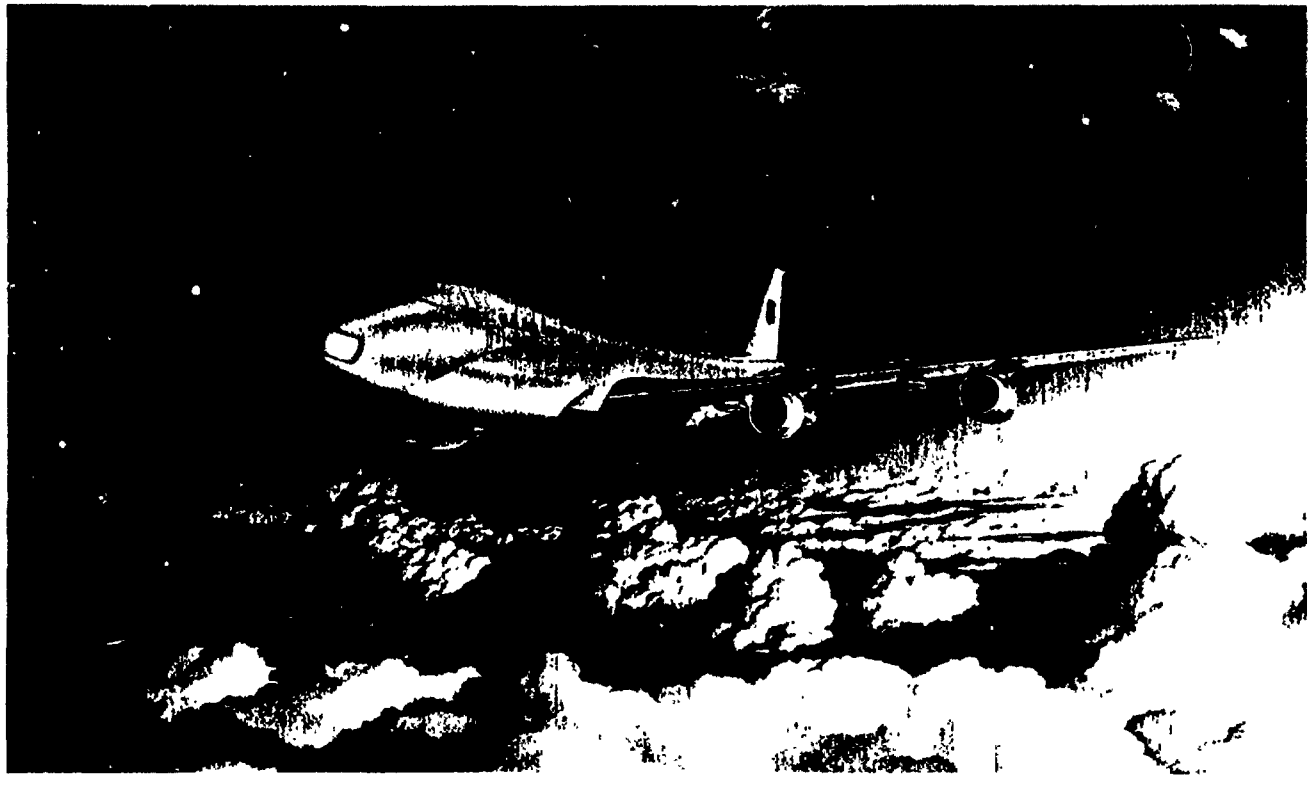
(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603319F
PE Title: Airborne Laser Technology

Project Number: 4269 **Date:** February 1994
Budget Activity: 4 - Demonstration and Validation
Old Budget Activity: 2 - Advanced Technology Development

Project Title: Airborne Laser



Program Element: 0603319F
PE Title: Airborne Laser Technology

Project Number: 4269 **Date:** February 1994
Budget Activity: 4 - Demonstration and Validation
Old Budget Activity: 2 - Advanced Technology Development

POPULAR NAME: Airborne Laser

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestone	Mar 93 Milestone 0				Dec 96 Milestone I			TBD
Engineering Milestone			Dec/Sep PRR/CoDR1		Oct 96 CoDR 2			TBD
T & E Milestone								TBD
Contract Milestone	Aug 93 Acquisition Plan Approved	Apr 94 Award Concept Design Contracts		May 96 Phase II RFP release	Jan 97 Downselect			TBD
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (to Complete)**
Major Contract	0	1000	17000	16800	12000			TBD
Support Contract	0	500	1500	1500	3500			TBD
In-House Contract	0	445	1500	1700	4500			TBD
GFE/Other	0	0	0	0	0			TBD
Total	0	1945	20000	20000	20000			TBD

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Program Element: 0603319F
PE Title: Airborne Laser Technology

Project Number: 4269 **Date:** February 1994
Budget Activity: 4 - Demonstration and Validation
Old Budget Activity: 2 - Advanced Technology Development

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Airborne Laser (ABL) is a program to demonstrate all necessary technologies required for acquiring, tracking, and killing Theater Ballistic Missiles in the boost phase. The Air Force approved program is a two-phased effort. Phase I involves award of two competing concept design contracts (FY 1994 - 1997) with downselection to a single contractor in FY 1997 who will build/test the winning ABL Demonstrator design (Phase II). Phase II completes in FY 2000 with lethality demonstrations against boosting Theater Ballistic Missiles. The Phase II effort must demonstrate all key technologies for a fully operational system allowing the Air Force to proceed with EMD/Production in the CY 2000 time frame should the Air Force decide to proceed with an operational fleet of ABLs. The Phase I Concept Design (PE063319) and Companion Phase I technology efforts (PE0603605) are fully funded. Phase II will proceed only if results of Phase I allow the program to pass exit criteria dealing with physics, and engineering-related issues. Deliveries from Phase I are full operational capability ABL designs, scalable/traceable ABL Demonstrator designs, contractor risk mitigation demonstrations to reduce Phase II engineering/aircraft integration risk, simulations in Air Combat Command (ACC) Theater Air Command and Control Simulation Facility (TACCSF), and ABL adjunct mission study for (a) cruise missile defense, (b) protection of high value assets, (c) defensive counter-air, (d) BMC^{4}I, (e) suppression of enemy air defenses, and (f) surveillance. The program passed Milestone 0 in Mar 93. Milestone I is estimated in early FY 1997. This project is research catagory 6.3B.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS: ($ in Thousands)

1. (U) FY 1993 Program: Not Applicable.

2. (U) FY 1994 Planned Program: Award dual 33 month competing ABL Concept Design contracts. Begin tasks/deliverables outlined above in Para B.
   - (U) Initiate design of airframe modifications, as well as the related hardware and software necessary to install and support the high energy laser and related subsystems into an existing 747 aircraft platform. ($90)
   - (U) Initiate design of a high power laser including fuel handling or power generation subsystem and resonator optical benches/components. ($250)
   - (U) Initiate design of a laser beam control subsystem to irradiate target with lethal energy density. ($220)
   - (U) Initiate design of avionics, battle management, and fire control components. ($40)

Program Element: 0603319F
PE Title: Airborne Laser Technology

Project Number: 4269 **Date:** February 1994
Budget Activity: 4 - Demonstration and Validation
Old Budget Activity: 2 - Advance Technology Development

- (U) Initiate development of analytical models/computer codes to predict the performance of the ABL to include the aircraft, weapons, and command and control elements. ($400)
- (U) Provide government participation in government/contractor Integrated Product Teams to accomplish Integrated Product Development of tasks described above. ($425)
- (U) Provide ACC/Air Staff technical support for continued ABL requirements, operational concept, and COEA development. ($250)
- (U) Continue maturing of theater integration and ABL adjunct mission capabilities through active defense and BMC^{4}I Integrated Product Teams and government modeling/simulation efforts such as the Theater Air Command and Control Simulation Facility (TACCSF). ($270)

3. (U) FY 1995 Planned Program: Continue all efforts under Concept Design contracts begun in FY 94 plus Initiate additional tasks described below:
- (U) Initiate contractor hardware/software demonstration to reduce engineering /aircraft integration risk for Phase II of the program. Results factor into Phase II downselect decision in FY 97. ($4600)
- (U) Begin contractor modeling of their ABL design in TACCSF. Results factor into Phase II downselect decision in FY 97. ($200)
- (U) Begin ABL adjunct mission studies described in Para B. above. ($200)
- (U) Conduct Operational Concept and Preliminary Requirement Reviews with government. ($8000)
- (U) Continue design and conduct first incremental Demonstrator Concept Design Reviews with government. ($4000)
- (U) Begin government Phase II environmental impacts studies. ($250)
- (U) Begin government Phase II test planning. ($250)
- (U) Support ACC/SMC/Air Staff in boost phase intercept COEA development. ($250)
- (U) Provide government participation in contractor's Integrated Product Teams for Integrated Product Development of all contract tasks. ($2000)
- (U) Provide government system security engineering and facility utilization planning support to contractors. ($250)

Program Element: 0603319F
PE Title: Airborne Laser Technology

Project Number: 4269 **Date:** February 1994
Budget Activity: 4 - Demonstration and Validation
Old Budget Activity: 2 - Advance Technology Development

modeling efforts in the TACCSF, and completion of ABL adjunct mission studies, and final support of COEA process. Evaluation of competing Phase II proposals also completes in FY 97. Award of single Phase II contract to build /teat winning Demonstrator contingent upon program successfully passing Phase I exit criteria.

D. (U) WORK PERFORMED BY: Phase I competing contracts include: (1) Boeing, Seattle WA (prime); Lockheed, Sunnyvale CA; TRW, Redondo Beach CA; ITEK, Lexington MA (sub-contractors) and (2) Rockwell, Canoga Park CA (prime); Hughes, Los Angeles CA; United Technologies Optical Systems, West Palm Beach FL; North America Aircraft, EL Segundo CA; Strategic Defense Centers, Seal Beach CA; E-Systems, Greenville TX; IBM, Boulder CO and Gaithersburg MD; Unisys, Salt Lake City UT and Eagan MN; Parsons, Pasadena CA (sub-contractors).
Government Integrated Product Teams include Phillips Laboratory ABL SPO, Laser Imaging Directorate, and Advanced Weapons and Survivability Directorate; Air Force Electronics System Center; Wright Laboratories; Air Combat Command; and US Army White Sans Missile Range.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) Technical Changes: No Change.

2. (U) Schedule Changes: The schedule was extended from 23 months to 33 months as a result of the FY 1994 50 percent funding reduction.

3. (U) Cost Changes: Congress reduced funding 50 percent during review of the FY 1994 budget.

F. (U) PROGRAM DOCUMENTATION:
- (U) Acquisition Plan for ABL Demonstrator Program, 12 Aug 93
- (U) PMD 2335(1) PE0603319F, PMD for ABL Technology Demonstrator, 29 Jul 93
- (U) Draft ABL ORD, CAF (USAF 004-06491-I-F), 30 Jun 93

Program Element: 0603319F
PE Title: Airborne Laser Technology
Project Number: 4269
Budget Activity: 4 - Demonstration and Validation
Old Budget Activity: 2 - Advance Technology Development
Date: February 1994

- (U) Joint MNS for TMD - JROC - 064-91, 18 Nov 91
- (U) AF MNS for TMD - 004-91, Oct 91
- (U) Joint Pub 3-01.5, Doctrine for Joint Theater Missile Defense, Jan 93
- (U) AF TMD CONOPS Revision, Jan 93 - signed 24 Feb 93
- (U) Milestone 0 Decision for AF MNS 004-91, TMD Acquisition Decision Memorandum -31 Mar 93
- (U) Airborne Laser Concept Design Technology Requirement Document (TRD), 30 Jun 93 (SECRET)
- (U) Airborne Laser Technology Insertion Plan, 7 Jan 94
- (U) Request for Proposals F29601-93-R-0003

G. (U) RELATED ACTIVITIES:

- (U) PE 0603605F, Advanced Weapons Technology, Project 3647; Develops and demonstrates technologies and conducts detailed assessments needed for high energy laser weapons in the areas of atmospheric measurements, advanced optics, laser device efficiency improvements, beam control and vulnerability test ands analysis.
- (U) PE 208060F, Theater Missile Defense; Air Force Theater Missile Defense is focused on two layers of defense against the massive world-wide proliferation of theater missiles. First, a capability to kill theater missiles in the ascent or boost phase and second, improvements to existing attack operations capability to detect, locate, and kill critical mobile targets on the ground.
- (U) PE 0603617F, Command, Control, Communications - C3 Applications; Funding for Air Force TMD program
- (U) PE 0604321F, Tactical Fusion Program; Funding for Air Force TMD program
- (U) PE 0207411F, Overseas Air Weapons Control System)
- (U) Joint Potential Designator (JPD) to be determined at Milestone I.
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense

H. (U) OTHER APPROPRIATION FUNDS ($ In Thousands): Not applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA: Not applicable.

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FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
1026 Space Structures and Controls Technology(1)	0	0	600	1,200	1,963	2,400	3,100	Cont	TBD
2181 Space Electronics and Software Technology	11,067	11,171	10,300	10,400	10,800	10,800	10,454	Cont	TBD
3784 Space Sensors and Satellite Communication Technology(2)	1,222	0	1,500	2,700	3,900	4,184	4,200	Cont	TBD
3834 Space Technology Integration and Demonstration	6,550	4,858	7,300	7,730	10,700	10,800	11,100	Cont	TBD
3977 Thermionic Space Power	4,106	0	0	0	0	0	0	Cont	TBD
682J Space Power and Thermal Management Technology(3)	3,176	4,430	4,500	4,700	5,500	5,500	5,600	Cont	TBD
Total	26,121	20,459	24,200	26,730	32,863	33,684	34,454	Cont	TBD

(1) This new Air Force project assumes and continues former Ballistic Missile Defense Organization (BMDO) advanced space vehicle (composite) structures and spacecraft structural controls work critical to the Air Force.
(2) In FY 1994, the project was zeroed by Congress due to its focus on 60 Gigahertz (GHz) communications. In FY 1995, the project will be refocused to assume critical BMDO passive sensors work and resume the non-60 GHz satellite communication technologies.
(3) In FY 1995, Project 682J will be broadened to Space Power and Thermal Management, assuming the former BMDO cryogenic cooling technologies critical to the Air Force.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Air Force Advanced Development program develops and demonstrates space vehicle technologies including integrated space flight and ground experiments. The broad goal is to decrease innovative space technology transition time and reduce the associated development costs and risks of future systems. Efforts are focused on four high payoff space force enhancement technology areas: advanced space vehicle structures and structural controls; hardened space vehicle electronics and software; advanced passive/active space-based sensors and satellite communication; and compact, low-cost space vehicle power and spacecraft thermal management. Following the direction of Congress, this PE will assume several long-term critical spacecraft technologies from the BMDO.

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 1026, Space Structures and Controls Technology: This project develops advanced composite structures and structural control technologies for future Air Force space and missile systems. This project assumes responsibility for these Air Force critical technologies from the Ballistic Missile Defense Organization (BMDO). Advanced composite applications focus on the demonstration of new spacecraft structure technologies whose goal is to significantly improve the payload mass fraction and shorten overall spacecraft fabrication time and cost. This project also continues BMDO's development of advanced space launch vehicle structures like fairings, tankage, interstages, struts, etc. This projects also develops advanced passive and active spacecraft structural control technologies. Structure vibration and shock suppression technologies are intended to significantly enhance space platform stability, improving the focusing/imaging ability of space-based optical components such as focal plane arrays developed in Project 3784 or solar cells developed in Project 682J.

   (U) FY 1993 Accomplishments: Not Applicable.

   (U) FY 1994 Planned Program: Not Applicable.

   (U) FY 1995 Planned Program:
   - (U) Continue former BMDO advanced composite space vehicle structure technology development. ($300K)
   - (U) Continue former BMDO advanced spacecraft structural control technology development. ($300K)

(U) Work Performed By: This program is managed by Phillips Laboratory, Kirtland AFB, NM. The BMDO major contractors are: TRW Space Technology Group, Seattle, WA; McDonnel-Douglas Aerospace, Huntington Beach, CA; Boeing Defense Space Group, Seattle, WA; Harris Corp Space Systems, Melbourne, FL; and Martin-Marietta Astronautics Group, Denver, CO;

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603218C, Research and Support.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

2. (U) Project 3784, Space Sensors and Satellite Communication Technology: This project was refocused from last year because of Congressional actions on the 60 GigaHertz (GHz) communication work and because the Air Force is assuming responsibility for spaceborne passive sensors from the Ballistic Missile Defense Organization (BMDO). This project develops military surveillance and space communication technologies. The project focuses on advancing space-based application of commercial sensors and communication technologies while improving performance, schedule, maturity, cost, and/or risk to future Air Force systems. The primary focus of the sensor efforts is to meet spaceborne sensor needs for theater missile defense. The focus of the satellite communication effort is to develop radio frequency (RF) and laser technologies for future military intra-space and space-ground communication systems. This project seeks to improve affordability, reliability, and performance while significantly reducing space sensor and satellite communication size, weight, cost, cooling, and power requirements.

(U) FY 1993 Accomplishments:
- (U) Continued assessing space sensor technology. ($200K)
- (U) Continued developing satellite communication technology such as intra-constellation RF crosslinks. ($1,022K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program:
- (U) Continue former BMDO space passive sensor technology which meets Air Force high priority needs. ($700K)
- (U) Develop satellite communication technology which supports RF and laser space communications needs. ($800K)

(U) Work Performed By: This program is managed by Phillips Laboratory, Kirtland AFB, NM. The major BMDO contractors are: Ball Aerospace, Boulder, CO; Sandia National Laboratory, Albuquerque, NM; General Electric (Martin-Marietta), Valley Forge, PA, and Syracuse, NY; MIT-Lincoln Laboratory, Lexington, MA; and MPB Technologies, Pointe Claire, Quebec, Canada.

(U) Related Activities:
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603226E, Experimental Evaluation of Major Innovative Technologies.
- (U) PE 0604711F, Extremely High Frequency Satellite Communications Research and Development.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

3. (U) Project 3834, Space Technology Integration and Demonstration: This project integrates enabling technologies onto space vehicles, demonstrating their future value and expediting transition to the warfighters. The primary focus of this project is demonstrating mature technologies on Space Technology Operational Evaluation Satellites (STOES). STOES is a relatively large-scale series of space experiments, demonstrating fully instrumented, highly capable, and responsive space platforms for high payoff technologies and operational concepts. The current STOES mission is the Technology for the Autonomous Operational Survivability (TAOS) program. TAOS is the only DoD satellite autonomy and survivability demonstration. TAOS will demonstrate and validate advanced spaceborne computers, autonomous navigation hardware/software, laser sensors, radar sensors, advanced data buses, and other operational concepts. The next STOES will be a platform demonstration of integrated technologies which meet Air Force Space Command's highest priorities such as: a multi-use common bus; a space object sensor to augment current ground sensors; satellite maneuvering; satellite control to reduce ground support; and orbit raising.

(U) FY 1993 Accomplishments
- (U) Integrated the Payload Data Panel onto the TAOS Space Test Experiments Spacecraft Bus. ($3,400K)
- (U) Completed TAOS-unique ground support hardware/software integration. ($2,000K)
- (U) Continued technology studies to support future demonstrations. ($1,150K)

(U) FY 1994 Planned Program:
- (U) Launch the TAOS experiment. ($2,600K)
- (U) Begin TAOS experiment mission analysis. ($800K)
- (U) Continued technology studies to support future demonstrations. ($1,000K)
- (U) Complete acquisition strategy/planning for next STOES demonstration. ($458K)

(U) FY 1995 Planned Program:
- (U) Complete TAOS experiment. ($2,300K)
- (U) Perform TAOS post-mission analysis. ($1,000K)
- (U) Develop concepts for next STOES effort, based on near-term technologies, which meet Air Force Space Command's highest priority needs. ($3,000K)
- (U) Downselect to best concept and begin demonstration effort. ($1,000K)

(U) Work Performed By: This program is managed by Phillips Laboratory, Kirtland AFB, NM. The major contractors are: TRW, Military Space Systems Division, Redondo Beach, CA; Rockwell Rocketdyne Division, Anaheim, CA; Honeywell Military Systems, Phoenix, AZ; GTE, Mountain View, CA; and I^{3}C, Foster City, CA.

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) Related Activities:
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603302F, Space and Missile Rocket Propulsion.
- (U) PE 0603438F, Satellite Systems Survivability.
- (U) PE 0604609F, Reliability and Maintainability Technology Insertion Program (RAMTIP).
- (U) PE 0603218C, Research and Support.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 3977, Thermionic Space Power: This project developed the non-nuclear technologies of power conversion, conditioning, and power system thermal management associated with space nuclear power systems. It investigated technologies for increasing the power subsystem performance, lifetime, survivability, and safety while reducing costs. It also helped define future space reactor technology objectives, guiding Department of Energy space nuclear power programs which support Air Force needs. In FY 1994, this project was terminated after combining with Project 682J, Space Power and Thermal Management Technology.

(U) FY 1993 Accomplishments:
- (U) Defined liquid metal heat pipe flight experiment integration and testing requirements. ($1,500K)
- (U) Performed liquid metal heat pipe laboratory ground testing. ($1,050K)
- (U) Tested thermionic heat pipe module. ($600K)
- (U) Fabricated ultra-strong, long-life power conversion component. ($956K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: Not Applicable.

(U) Related Activities: Not Applicable.

(U) Other Appropriation Funds: Not Applicable.

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 682J, Space Power and Thermal Management Technology: This project develops and demonstrates compact, low-cost, satellite power generation, storage, distribution, and satellite thermal management including cryogenic cooling technologies. Power generation work focuses on lightweight, low-cost, low volume, and survivable solar cell arrays. Energy storage work focuses on lightweight Nickel Hydrogen (NiH_2) and Sodium Sulfur (NaS) spacecraft batteries for extended (five-ten year) satellite missions. Power distribution efforts focus on producing lightweight, high efficiency, standardized power busses for use on future Air Force space programs. This project also develops and demonstrates the non-nuclear technologies associated with space nuclear power systems such as power conversion, conditioning, and power system thermal management. It investigates alternative technologies to increase space vehicle power subsystem performance, lifetime, survivability, and safety while reducing costs/risks. Successes will help define future technology objectives such as advanced active sensor arrays, advanced meteorological satellites, and combined space power concepts. In FY 1995, this project assumes responsibility to develop spacecraft thermal management technologies such as cryogenic coolers necessary to maintain passive sensors in low optical backgrounds.

(U) FY 1993 Accomplishments:
- (U) Continued development of space conventional power technologies such as advanced solar cell arrays. ($1,500K)
- (U) Continued development of space vehicle conventional power technologies such as compact batteries. ($1,676K)

(U) FY 1994 Planned Program:
- (U) Continue development of space conventional power technologies such as advanced solar cell arrays. ($1,200K)
- (U) Continue development of space vehicle conventional power technologies such as compact volume/weight batteries. ($2,500K)
- (U) Continue development of non-nuclear technologies associated with space nuclear power systems such as the thermionics work previously done under Project 3977. ($730K)

(U) FY 1995 Planned Program:
- (U) Continue development of space conventional power technologies such as advanced solar cell arrays. ($1,100K)
- (U) Continue development of space vehicle conventional power technologies such as compact volume/weight batteries. ($2,200K)
- (U) Continue development of non-nuclear technologies associated with space nuclear power systems such as thermionics technology. ($600K)
- (U) Continue former Ballistic Missile Defense Organization (BMDO) space vehicle thermal management technology development such as cryogenic coolers. ($600K)

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) Work Performed By: This program is managed by Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Boeing Defense and Space Group, Seattle, WA; Eagle-Pycher, Joplin, MO; Gates, Ft Lauderdale, FL; L'Gaude, Tustin, CA; and Martin-Marietta, Denver, CO.

(U) Related Activities:
- (U) PE 0602203F, Aerospace Propulsion
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603218C, Research and Support.
- (U) PE 0603226E, Experimental Evaluation of Major Innovative Technologies.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology

Project Number: 2181
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Space Electronics and Software Technology	11,067	11,171	10,300	10,400	10,800	10,800	10,454	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Advanced Development project develops and demonstrates technologies enabling interchangeable, interoperable, and standardized data and signal processing electronics and software for future Air Force space and missile systems. This project will demonstrate the capability to produce space-qualified, Very High Speed Integrated Circuit based components, wafer scale integration (WSI) packages, electronic processors, and reusable standardized software. In the near-term, this project concentrates on converting (hardening) commercial data and signal processor technologies for use in space and missile systems. In addition, advanced electronic packaging technologies, reducing weight and volume, are being developed for broad military and commercial space applications. This project develops and demonstrates space data processor technologies like the Advanced Spaceborne Computer Module (ASCM) technology (16-bit). ASCM is currently baselined into 65 DoD, NASA, and commercial programs. The ASCM follow-on program, the Advanced Technology Insertion Module (ATIM) (32-bit), seeks to continue this success. This project also develops and demonstrates space signal processor technologies like the Hardened Ada Signal Processor (HASP) program. This project develops and verifies reusable standard interface software for integrating spacecraft and ground systems to increase spacecraft autonomy from ground stations. In the long-term, this project focuses on developing an integrated avionics-like architecture for satellites where high-speed data busses centralize many of the functions now scattered about the space vehicle. Additional work develops and demonstrates very low power electronics allowing dramatic size, weight, and power reductions for future Air Force space and missile applications.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Continued development of space-qualifiable, hardened data processor electronics technologies including delivering the ASCM. ($9,367K)
   - (U) Continued development of space-qualifiable, hardened signal processor electronics technologies including completing the HASP chip design. ($500K)
   - (U) Continued development of space-qualifiable, advanced packaging electronics technologies such as the highest density memory package WSI. ($600K)

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology

Project Number: 2181
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) Continued development of astrodynamic software technologies such as the laser geodynamic satellite (LAGEOS) program. ($300K)
- (U) Continued development of reusable, space standardized software technologies such as Reusable Software Architecture for Spacecraft (RSAS). ($300K)

2. (U) FY 1994 Planned Program:
   - (U) Continue development of space-qualifiable, hardened data processor electronics technologies such as the 32-bit Advanced Technology Insertion Module (ATIM). ($9,171K)
   - (U) Continue development of space-qualifiable, hardened signal processor electronics technologies such as the Hardened Ada Signal Processor (HASP) and standard electronic devices. ($200K)
   - (U) Continue development of space-qualifiable, advanced packaging electronics technologies such as wafer scale integration (WSI). ($700K)
   - (U) Continue development of astrodynamics software technologies such as the LAGEOS program. ($300K)
   - (U) Continue development of reusable, space standardized software technologies such as RSAS. ($300K)
   - (U) Begin development of space-qualifiable Accelerated Insertion of Standard Microelectronics (AISM). ($500K)

3. (U) FY 1995 Planned Program:
   - (U) Continue development of space-qualifiable, hardened data processor electronics technologies such as ATIM. ($7,200K)
   - (U) Continue development of space-qualifiable, hardened signal processor electronics technologies such as HASP and standard electronic devices. ($1,000K)
   - (U) Continued development of space-qualifiable, advanced packaging electronics technologies such as WSI. ($600K)
   - (U) Continue development of reusable, space standardized software technologies such as RSAS. ($600K)
   - (U) Continue development of space-qualifiable AISM. ($900K)

4. (U) Program To Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: This program is managed by Phillips Laboratory, Kirtland AFB, NM. The major contractors are: Honeywell Electronics, Clearwater, FL; IBM Electronics, Manassas, VA; Mission Research Corp., Santa Barbara, CA; Texas Instruments, Dallas, TX; and General Electric, Schenectady, NY.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

Program Element: #0603401F
PE Title: Advanced Spacecraft Technology

Project Number: 2181
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
- (U) USSPACECOM MROC 04-88, Integrated Satellite Control System, Jan 88.
- (U) AFSPACECOM SON 006-89, Space Support, Interoperability, and Readiness, Mar 89.

G. (U) RELATED ACTIVITIES:
- (U) PE 0303601F, MILSTAR Satellite Communications System.
- (U) PE 0305160F, Defense Meteorological Satellite Program (DMSP).
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603215C, Limited Defense System.
- (U) PE 0603218C, Research and Support.
- (U) PE 0603226E, Experimental Evaluation of Major Innovative Technologies.
- (U) PE 0604609F, Reliability and Maintainability Technology Insertion Program (RAMTIP).
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603402F
PE Title: Space Test Program (STP)
Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

	FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
2620	Shuttle Secondaries								
	1,135	2,191	3,645	3,850	3,816	3,873	3,958	Cont	TBD
2617	Free-Flyer Spacecraft Missions								
	52,710	41,083	43,173	39,438	42,173	43,792	44,932	Cont	TBD
4233	Small Launch Vehicles (SLV)								
	0*	0*	15,266	25,245	18,757	19,343	19,980	Cont	TBD
Total									
	53,845	43,274	62,084	68,533	64,746	67,008	68,870	Cont	TBD

(*- Small Launch Vehicle funds in FY1993 and 1994 were provided by PE# 0305119F, Medium Launch Vehicles)

B. (U) BRIEF DESCRIPTION OF ELEMENT: STP advances DoD technology by providing spaceflight missions for experiments whose scope ranges from basic research to advanced development. This program is in Research Category 4 Demonstration and Validation because it validates models dealing with the space environmental effects on operational space systems as well as demonstrating new space systems technologies, concepts and designs. This DoD program

Program Element: #0603402F
PE Title: Space Test Program (STP)
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Old Budget Activity: 6 Defense-wide Mission Support

Date: February 1994

provides the only substantial spaceflight capability to perform fly-before-buy demonstrations of advanced technologies. STP experiments are flown by priority based on relevance to existing military requirements and the availability of cost-effective means of spaceflight on expendable launch vehicles or the Shuttle. Without the requested funding, DoD will lose a high leverage capability to launch and test critical technologies which support operational space systems. Furthermore, the individual services will be forced to duplicate this low cost risk mitigation capability and development of space research technologies will stop in the laboratory short of prototyping.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2620 Shuttle Secondaries:
This STP project supports the flight of space experiments whose requirements are best met by flight on the Space Shuttle. Shuttle flight opportunities are taken advantage of to the maximum extent possible by having STP experiments available and ready prior to NASA's formal manifesting decision point. In addition, NASA has allocated seven percent of each Shuttle mission's middeck locker space for STP use. Typical spaceflight opportunities for STP on Shuttle include middeck lockers, hitchhiker platforms, Get Away Special (GAS) cans, the SPARTAN platform and others as available.

(U) FY 1993 Accomplishments:
- (U) 18 middeck locker experiments were flown on four Shuttle missions: $1.135M

(U) FY 1994 Planned Program:
- (U) Fly manifested Shuttle payload bay and middeck locker experiments: $2.191M

Program Element: #0603402F
PE Title: Space Test Program (STP)
Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support

Date: February 1994

(U) FY 1995 Planned Program:
- (U) Manifest backlogged experiments and support new experiments as Shuttle capacity allows: $3.645M

(U) Work Performed By: The responsible AF agency is AF Materiel Command's Space and Missile Systems Center, Los Angeles AFB, CA. Work is performed by Space and Missile Systems Center's Operating Location AW at Johnson Space Center, Houston, TX. Shuttle payload integration support is provided by Muniz Engineering,Inc and DUAL, Inc. Systems engineering is provided by the Aerospace Corporation, El Segundo, CA. Government developing organizations include NASA/Goddard Space Flight Center, Greenbelt, MD, and NASA/Johnson Space Center, Houston, TX.

(U) Related Activities:
- (U) PE #0305171F (Space Launch Support) provided $1.559M of the integration support for STP experiments which flew in the Shuttle middeck and payload bay during FY1993. Funds for future Shuttle efforts were transfered to PE 0603402F beginning with FY1994. From this point forward, PE# 0603402F is now responsible for all such effort in the future.

- (U) There is no unnecessary duplication of effort within the AF or DoD.

(U) Other Appropriation Funds ($ in Thousands): Not applicable.

(U) International Cooperative Agreements: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603402F
PE Title: Space Test Program (STP)
Project Number: 2617
Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support
Date: February 1994

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

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
2617 Free-Flyer Spacecraft Missions								
52,710	41,083	43,173	39,438	42,173	43,792	44,932	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This STP project advances DoD space technology by providing spaceflight for DoD prioritized experiments. The Free-Flyers available to STP include: The Small Launch Vehicle (SLV) class Space Test Experiments Platform (STEP) satellite bus, a larger Medium Launch Vehicle (MLV) class STP dedicated satellite bus such as that used for the P91-1 Advanced Research and Global Observation Satellite (ARGOS) mission, and piggyback or secondary opportunities on operational DoD and commercial satellites both foreign and domestic. In addition, certain experimenters with the required resources may provide their own satellite bus on those occasions when the STP budget is inadequate to accomodate them. Historically, 45% of the free-flyer experiments can be satisfied by small satellite (100 to 500 pound class) missions, 35% require medium satellite (500 to 4,000 pounds) missions and 20% fly as piggyback missions.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:

(U) - Conducted Preliminary & Critical Design Reviews for ARGOS, initiated P94-1 Fast On-Orbit Recording of Transient Events (FORTE) and P94-2 Radiation Experiment (REX II), continued development of STEP missions 0,1,2,3 and Advanced Photovoltaic and Electronics Experiments (APEX) (P90-5, P90-1, P91-2, P92-2 and P90-6), launched P89-

Program Element: 0603402F
PE Title: Space Test Program (STP)
Project Number: 2617
Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support
Date: February 1994

1B Array of Low Energy X-ray Imaging Sensors (ALEXIS) , P92-1 Radar Calibration (RADCAL), S86-7 Magnetosphere Atmospheric X-ray Imaging Experiment/ Energetic Heavy Ion Counter Experiment (MAXIE/EHIC), S93-1 Beryllium-7 Induced Radiation Experiment (BINRAD) and S88-1 Polar Ozone and Aerosol Measurement (POAM II) : $52.710M

2. (U) FY 1994 Planned Program:

(U) - Initiate STEP mission 4, continue development of FORTE, build and test ARGOS spacecraft and begin experiment integration, launch STEP missions 0,1,2, APEX, S90-4 Middle Atmosphere High Resolution Spectrograph Investigation (MAHRSI), P90-4 Far Ultraviolet Imaging Spectrograph (FUVIS), and S91-4 Solar Wind Interplanetary Measurements (SWIM): $41.083M.

3. (U) FY 1995 Planned Program:

(U) - Initiate STEP mission 5, continue development of STEP mission 4, launch P92-2 STEP mission 3 and REX II: $43.079M

4. (U) Program to Completion:

(U) - This is a continuing program.

D. (U) Work Performed By: The responsible Air Force agency is Air Force Materiel Command, Space and Missile Systems Center, Los Angeles AFB, CA. Systems engineering is provided by the Aerospace Corporation, El Segundo, CA. Government developing organizations include NASA/Goddard Space Flight Center, Greenbelt, MD. Contractors include TRW, Redondo Beach, CA; Defense Systems, Inc., McLean, VA; Rockwell International, Seal Beach CA; and Orbital Sciences Corporation, Dulles, VA.

Program Element: 0603402F
PE Title: Space Test Program (STP)
Project Number: 2617
Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support
Date: February 1994

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: STEP mission 0 and APEX launch delayed due to late experiment delivery and spacecraft bus development problems. CHARGECON-GEO, and SWIM piggyback launches delayed due to host satellite schedule delays. RAIDS (S86-8) removed from host TIROS satellite due to earlier NOAA satellite failure and requirement to fly different instrument in its place. STEP mission 5 replanned to FY95 and STEP mission 6 replanned to FY96 due to cost growth in APEX, ARGOS and STEP missions 0 and 1. STEP missions 0,1 and 2 slipped to FY94. STEP mission 3 slipped to FY95. ARGOS slip to FY96 due to reduction in appropriated funds and cost growth.
3. (U) COST CHANGES: Level of effort program. Cost growth in any area reduces the ability to fly as many experiments.

F. (U) PROGRAM DOCUMENTATION:
- (U) DoD Regulation (AFR 80-2/AR 70-43/OPNAVINST 3913.1), STI Management, 30 November 1984.

G. (U) RELATED ACTIVITIES:
- (U) PE 0305119F, (Medium Launch Vehicles).
- (U) PE 0305171F, (Space Launch Support).
- (U) There is no unnecessary duplication of effort within the AF or DoD.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: A Memorandum of Agreement (MOA) exists between STP and ONR to secure secondary capacity on the French Centre National d'Etudes Spatiales (CNES) SPOT-3 spacecraft for Office of Naval Research's Polar Ozone and Aerosol Measurement (POAM II) experiment. Another MOA exsists between STP

Program Element: 0603402F | Project Number: 2617 | Date: February 1994
PE Title: Space Test Program (STP) | Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support

and NRL to secure secondary capacity on the Russian RESURS spacecraft.

J. (U) MAJOR MILESTONES:

1.	ARGOS (P91-1) Preliminary Design Review	Oct/ 1992
2.	Launch ALEXIS (P89-1B) on Pegasus	Apr/ 1993
3.	ARGOS (P91-1) Critical Design Review	Apr/ 1993
4.	Launch RADCAL (P92-1) on Scout	Jun/ 1993
5.	Launch EHIC and MAXIE (S86-7) on Atlas-E/TIROS	Aug/ 1993
6.	Launch BINRAD (S93-1) on Soyuz/RESURS-F1	Aug/ 1993
7.	Launch of POAM-II (S88-1) on Ariane/SPOT-3	Sep/ 1993
8.	Launch STEP Mission 0 (P90-5) on Taurus	Feb/ 1994
9.	Launch STEP Mission 2 (P91-2) on Pegasus	Mar/ 1994
10.	Launch APEX (P90-6) on Pegasus	Apr/ 1994
11.	Launch SWIM (P91-4) on Delta II/WIND	Apr/ 1994
12.	Launch STEP Mission 1(P90-1) on Pegasus XL	May/ 1994
13.	Launch STEP Mission 3 (P92-2) on Pegasus XL	Oct/ 1994
14.	Launch MAHRSI (S90-4) on Space Shuttle/CRISTA-SPAS	Oct/ 1994
15.	Launch REX II (P94-2) on Pegasus	Apr/ 1995
16.	Launch CHARGECON-GEO (S90-3) on Atlas-II/DSCS III	May/ 1995
17.	Launch ARGOS (P91-1) on Delta II	Jan/ 1996
18.	Launch POGS-II (S92-1) onTitan II/DMSP	Dec/ 1996

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603402F
PE Title: Space Test Program (STP)
Project Number: 4233
Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support
Date: February 1994

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

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
4233 Small Launch Vehicles (SLV)								
0*	0*	15,266	25,245	18,757	19,343	19,980	Cont	TBD

(*- Small Launch Vehicle funds in FY1993 and 1994 were provided by PE# 0305119F, Medium Launch Vehicles)

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Access to space, directed by the President in the National Security Launch Strategy, will be accomplished for small Government payloads through the use of the Air Force Small Launch Vehicle (AFSLV). Primary SLV support is currently provided by the Pegasus XL air launched vehicle which is supported by both western and eastern launch ranges. The only current user of the AFSLV/Pegasus XL is the DoD Space Test Program for purposes of flying DoD experimental payloads. The Pegasus launch vehicle is made available to other DoD users as well on a cost-reimbursable basis.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:

(U) - ARPA contract for last four Pegasus launches transfered to Air Force, launched F-3/ALEXIS, reallocated Pegasus F-5 from BMDO to support REX II, continued development of F-4 for APEX and F-6 for STEP mission 2. Under the AFSLV contract, continued development of XL-1/STEP mission 1 and XL-2/STEP mission 3: $15.832M provided by PE#0305119F (Medium Launch Vehicles)

Program Element: 0603402F
PE Title: Space Test Program (STP)
Project Number: 4233
Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support
Date: February 1994

2. (U) FY 1994 Planned Program:

(U) - Initiate Pegasus XL-3 for FORTE and XL-4 for STEP mission 4, launch Pegasus F-4 for APEX, F-6 for STEP mission 2, XL-1 for STEP mission 1: $21.215M provided by PE#0305119F (Medium Launch Vehicles)

3. (U) FY 1995 Planned Program:

(U) - Initiate Pegasus XL-5 for STEP mission 5, continue development of Pegasus XL-3 for FORTE, XL-4 for STEP mission 4, launch Pegasus F-5 for REX-II and XL-2 for STEP mission 3: $15.266M

4. (U) Program to Completion:

(U) - This is a continuing program.

D. (U) Work Performed By: The responsible Air Force agency is Air Force Material Command's Space and Missile Systems Center, Los Angeles AFB, CA. Pegasus contractors are: Orbital Sciences Corporation, Dulles, VA (prime contractor); Hercules Aerospace Corporation, Magna, UT (solid rocket motor); Scaled Composites, Mojave, CA (composite wing).

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Pegasus payload fairing modified to reduce contamination produced at separation.
2. (U) SCHEDULE CHANGES: Pegasus and Pegasus XL flights slipped due to Pegasus F-2 flight anomaly resolution and slips in some of the associated spacecraft schedules.
3. (U) COST CHANGES: None.

Program Element: 0603402F
PE Title: Space Test Program (STP)
Project Number: 4233
Budget Activity: 4 Demonstration and Validation (Dem/Val)
Old Budget Activity: 6 Defense-wide Mission Support
Date: February 1994

F. (U) PROGRAM DOCUMENTATION:
- (U) National Space Policy, January 1988.
- (U) Program Decision Memorandum, 25 July 1988.

G. (U) RELATED ACTIVITIES:
- (U) PE 0305119F, (Medium Launch Vehicles).
- (U) There is no unnecessary duplication of effort within the AF or DoD.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MAJOR MILESTONES:

1.	Launch Pegasus F-3 for ALEXIS	Apr/ 1993
2.	Launch Pegasus F-6 for STEP Mission 2	Mar/ 1994
3.	Launch Pegasus F-4 for APEX	Apr/ 1994
4.	Launch Pegasus XL-1 for STEP Mission 1	May/ 1994
5.	Launch Pegasus XL-2 for STEP Mission 3	Oct/ 1994
6.	Launch Pegasus F-5 for REX II	Apr/ 1995
7.	Launch Pegasus XL-3 for FORTE	Oct/ 1995

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603410F
PE Title: Space Systems Environmental Interactions Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2821 Space Systems Design and Test Standards*	600	180	0	0	0	0	0	0	780
2822 Space Environmental Impact Tests**	2,712	2,315	3,250	2,493	2,702	2,823	3,274	Cont	TBD
2823 Space Hazards Mitigation**	600	1,125	950	1,685	1,653	1,415	1,059	Cont	TBD
Total	3,912	3,620	4,200	4,178	4,355	4,238	4,333	Cont	TBD

* In FY 1995, Project 2821 will be terminated and the technical content moved into Projects 2822 and 2823.
** Funding variations in Projects 2822 and 2823 in FY 1994-96 reflect their dependence on the launches of orbital satellites and space shuttle missions, activities that do not come under the direct control of this Program Element.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops space flight technologies that provide demonstrated, cost-effective solutions to mitigate hazardous space environmental interactions that degrade spacecraft operations. The information gained through these programs is directly transferred to operational users in the form of new and revised military standards, handbooks, and computer-aided engineering (CAE) and assessment (CAA) tools. Advanced technology products include: (1) an autonomous active charge control system (CCS) to prevent charge buildup on high-altitude spacecraft; (2) a compact environmental anomaly sensor (CEASE) to provide warning to satellites of space-environmental conditions likely to cause anomalous operations; and (3) improved specifications for advanced solar array technologies from the Photovoltaic Array Space Power Plus (PASP Plus) Diagnostics experiment. Additional space experiments are the Charging Hazard and Wake Studies (CHAWS) experiment to determine space environmental hazards to exposed high voltages and the Space Waves in Plasmas Experiment (SWIPE) to look at space effects of high frequency radio transmissions. The program's objective is to improve Air Force space systems survivability and reliability and expedite the transfer of new technology into planned military capabilities.

Program Element: #0603410F
PE Title: Space Systems Environmental Interactions Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2821, Space Systems Design and Test Standards: This project integrates the results of experiments conducted under Project 2822, Space Environmental Impact Tests, into useful analysis tools for Air Force space systems operators and designers. Results are used to improve engineering design guidelines and test standards, develop new radiation models and microelectronic test standards, and to enhance computer algorithm codes/models to aid in the analysis of environment-induced effects on spacecraft systems.

   (U) FY 1993 Accomplishments:
   - (U) Completed Spacecraft Charging Military Standard (MIL-STD). ($180K)
   - (U) Completed Single Event Upset (SEU) Model for microelectronic design. ($420K)

   (U) FY 1994 Planned Program:
   - (U) Complete SEU model to improve satellite microelectronic design. ($105K)
   - (U) Complete Spacecraft Charging MIL-STD documentation and final report. ($75K)

   (U) FY 1995 Planned Program: Not Applicable.

   (U) Work Performed By: This project is managed by Phillips Laboratory, Hanscom AFB, MA. The main contractors are: S-Cubed Inc., La Jolla, CA; Maxwell Laboratories, Inc., San Diego, CA; University of Chicago, Chicago, IL; Louisiana State University, Baton Rouge, LA; and Lockheed Palo Alto Research Laboratory, Palo Alto, CA.

   (U) Related Activities:
   - (U) NASA/USAF Space Technology Interdependency Group coordinates efforts and reviews programs annually.
   - (U) PE 0602601F, Phillips Laboratory.
   - (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

   (U) Other Appropriation Funds: Not Applicable.

   (U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2822, Space Environmental Impact Tests: To effectively counter adverse spacecraft-environment interactions, in-space demonstrations must be conducted to understand how new materials and technologies are affected by space. Much still remains unknown on the exact interaction mechanisms that cause thermal insulators and optical sensor deterioration, and deep-dielectric charging arcs that can cause spurious signals and upsets in micro-electronics. The project's technical programs will result in: (1) significant improvements in the Science and Technology (S&T) base by developing space instrumentation that will measure hazards posed by the natural environment; (2) increased operational performance,

Program Element: #0603410F
PE Title: Space Systems Environmental Interactions Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

longer lifetimes, and enhanced reliability of advanced space systems; and (3) an earlier capability to withstand the adverse effects of the space environment.

(U) FY 1993 Accomplishments:
- (U) Completed integration of the Photovoltaic Array Space Power Plus (PASP Plus) flight experiment into the Advanced Photovoltaics and Electronics Experiment (APEX) satellite for launch on the Pegasus low-cost launch vehicle. ($877K)
- (U) Completed preliminary Shuttle Potential and Return Electron Experiment (SPREE) data analysis and published preliminary report. ($431K)
- (U) Delivered and integrated the Charge Hazards and Wake Studies (CHAWS) experiment with the University of Houston's Wake Shield Facility; scheduled for Space Transportation System (STS) launch. ($582K)
- (U) Completed conceptual design for Space Wave Interactions With Plasma Experiment (SWIPE) Electrostatic Particle Instruments. ($270K)
- (U) Delivered the Shuttle Orbiter Contamination Representation Accounting for Transiently Emitted Species (SOCRATES) computer code for predicting plume far field, multispectral signatures to the National Air Intelligence Center for utility testing and initiated follow-on Nonequilibrium Original Monte Carlo With Approximate Dynamics (NOMAD) code development for near-real-time signature assessments. ($552K)

(U) FY 1994 Planned Program:
- (U) Launch PASP Plus (the DoD's most comprehensive, high technology solar array demonstration) on the APEX/Pegasus small launch vehicle mission and begin data reduction and analysis of the flight data. ($737K)
- (U) Continue SPREE data analysis, publish final instrument report, and validate large-structure charging algorithm. ($349K)
- (U) Launch CHAWS experiment as part of the Wake Shield Facility on STS-60 and publish preliminary technical report. ($729K)
- (U) Fabricate and deliver the SWIPE Energetic Particle Instruments (EPIs) for flight aboard the Canadian Space Agency (CSA) sounding rocket to study high frequency radio propagation. ($360K)
- (U) Use artificial intelligence (AI) to develop integrated magnetospheric/ionospheric models for space operations. ($140K)

(U) FY 1995 Planned Program:
- (U) Analyze data and produce reports on high-voltage plasma interactions limitations and radiation degradation for advanced solar-array technologies based on PASP Plus results. ($825K)
- (U) Incorporate charging algorithm from SPREE into Space and Missile Systems Center (SMC) modeling codes; prepare SPREE for reflight. ($600K)
- (U) Continue analysis and report on CHAWS Mission 1 data and prepare CHAWS for Mission 2. ($850K)
- (U) Support integration testing and launch of SWIPE on Observation of Electric Field Distributions in the Ionospheric Plasma: a Unique Solution (OEDIPUS)-C from Poker Flats, Alaska. ($500K)
- (U) Begin conceptual design of Small On-Board Environmental Diagnostic Sensor (SOBEDS). ($475K)

Program Element: #0603410F
PE Title: Space Systems Environmental Interactions Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) Work Performed By: This project is managed by Phillips Laboratory, Hanscom AFB, MA. The main contractors are: Amptek Inc., Bedford, MA; Panametrics Incorporated, Waltham, MA; Johns Hopkins University's Applied Physics Laboratory, Laurel, MD; Maxwell Laboratories, Inc., San Diego, CA; and Spectral Sciences Inc., Burlington, MA.

(U) Related Activities:
- (U) NASA/USAF Space Technology Interdependency Group coordinates efforts and reviews programs annually.
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603401F, Advanced Spacecraft Technology.
- (U) PE 0603438F, Satellite Systems Survivability.
- (U) PE 0603402F, Space Test Program.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: This program has initiated a cooperative agreement between the Phillips Laboratory (Geophysics Directorate) and the Canadian Space Agency (CSA) to provide diagnostic instrumentation as part of the joint Air Force and NASA/CSA Waves in Space Plasmas (WISP) mission. WISP is scheduled for launch using a sounding rocket in September 1995. Because of the numerous technical benefits provided by the diagnostic instrument package, all Air Force launch and integration costs are being provided by the CSA.

3. (U) Project 2823, Space Hazards Mitigation: The Air Force needs the capability to prevent electrical charge buildup and the resulting disabling discharges on its operational satellites. For high-altitude and geosynchronous spacecraft, a Charge Control System (CCS) has been developed. The system is being integrated aboard a Defense Satellite Communications System (DSCS) satellite to validate the concept of autonomous active charge control and to baseline an engineering design. For low/medium orbit satellites, a Compact Environmental Anomaly Sensor (CEASE) is being designed and developed to provide warnings on space conditions likely to produce anomalous operational behavior.

(U) FY 1993 Accomplishments:
- (U) Integrated the autonomous active CCS onto the DSCS-B7 satellite and programmed the flight software for the charging algorithm. ($240K)
- (U) Completed preliminary design of CEASE and began flight-unit development of the demonstration hardware. ($360K)

(U) FY 1994 Planned Program:
- (U) Support CCS testing aboard DSCS-B7 satellite; plan on-orbit operations. ($325K)
- (U) Continue CEASE flight unit development; identify launch vehicle through Space Test Program. ($800K)

Program Element: #0603410F
PE Title: Space Systems Environmental Interactions Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) FY 1995 Planned Program:
- (U) Launch the autonomous active Charge Control System (CCS) on the Defense Satellite Communications System (DSCS) satellite; provide on-orbit support and begin analyzing data. ($250K)
- (U) Complete Compact Environmental Anomaly Sensor (CEASE) demonstration hardware fabrication and begin environmental testing. ($700K)

(U) Work Performed By: This project is managed by Phillips Laboratory, Hanscom AFB, MA. The contractors are: Assurance Technology Corp., Carlisle, MA; and Amptek Inc., Bedford, MA.

(U) Related Activities:
- (U) NASA/USAF Space Technology Interdependency Group coordinates efforts and programs reviews annually.
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603402F, Space Test Program.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603430F
PE Title: Advanced MILSATCOM

Project Number: 4050
Budget Activity: 4 - Demonstration Validation
Old Budget Activity: N/A

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Advanced MILSATCOM								
0	0	22,095	21,421	28,766	41,388	83,399	TBD	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Develop and acquire an advanced Military Satellite Communications (MILSATCOM) satellite, satellite mission control interface, and new or modified communications terminals for survivable, jam-resistant, world-wide, secure communications for the strategic and tactical warfighter. This descriptive summary addresses demonstration/validation efforts to reduce the risk associated with providing Milstar II capability in a Medium Launch Vehicle (MLV) weight class satellite by 2006. The activities funded under this program element fully implement the SECDEF's 1993 MILSATCOM Bottom Up Review decision to field a lower cost, advanced MILSATCOM satellite to replenish the Milstar II constellation.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program: None.

2. (U) FY 1994 Planned Program: None.

3. (U) FY 1995 Planned Program:
   (U) MILSATCOM Technology Validation Program ($22,095)
   (U) - Start validation of advanced EHF digital signal processing packaging designs
   (U) - Start validation of lightweight, complex beam array antennas and feed components
   (U) - Start validation of lightweight EHF terminal processors, receivers, and transmitters
   (U) - Start validation of EHF phased array antennas
   (U) - Start evaluation of advanced materials and structural designs for a lightweight spacecraft
   (U) - Start demonstration of lightweight frequency generation, distribution, amplification, and switching designs
   (U) Advanced MILSATCOM System ($0)

4. (U) Program to Completion:
   (U) MILSATCOM Technology Validation Program
   (U) - Continue selected engineering validation efforts based on projected risk reduction and life cycle cost savings from implementing the technology in a future system

Program Element: 0603430F
PE Title: Advanced MILSATCOM

Project Number: 4050
Budget Activity: 4 - Demonstration Validation
Old Budget Activity: None

Date: February 1994

(U) Advanced MILSATCOM System
(U) - Design, develop, and produce an advanced MILSATCOM system capable of meeting future MILSATCOM requirements

D. (U) WORK PERFORMED BY: The Aerospace Corporation, El Segundo, CA, MITRE Corporation, Bedford, MA, and Massachusetts Institute of Technology (MIT) Lincoln Laboratories, MA provide systems engineering and technical support to the MILSATCOM Program Office, Los Angeles AFB, CA. Several competitive contracts to be awarded in FY95.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: No RDT&E funds in 1994.

F. (U) PROGRAM DOCUMENTATION:
- (U) Milstar Operational Requirements Document (ORD), 4 Sep 92.
- (U) Milstar System Threat Assessment Report (STAR), Apr 92.

G. (U) RELATED ACTIVITIES:
- (U) PE 0303601F, Milstar Terminals
- (U) PE 0303603F, Milstar Satellite
- (U) PE 0604479F, Milstar LDR/MDR Satellite Communications
- (U) PE 0603432F, Polar Adjunct
- (U) PE 0303605F, SATCOM Terminals
- (U) PE 0303110F, Defense Satellite Communications System (DSCS)
- (U) PE 0603433F, DSCS Replenishment
- (U) PE 0305144F, Titan IV Space Launch Vehicles
- (U) PE 0604577N, EHF Satellite Communications
- (U) PE 0303142A, Tactical Communications Ground Environment
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATIONS FUNDS ($ in Thousands): None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MAJOR MILESTONES:

(U) MILSATCOM Technology Validation Program (Start-Finish)	Oct 94 - Sep 99
Advanced MILSATCOM System	
Demonstration and Validation Milestone 1	Jan 98
Engineering & Manufacturing Development Milestone 2	Sep 99
Advanced MILSATCOM #1 Launch	Jan 06

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603434F
PE Title: Defense Meteorological Satellite Program Block 6
Budget Activity: #4. Demonstration/Validation
Old Budget Activity: #6. Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands).

	FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
4056 DMSP Block 6	*0	*0	7,601	24,481	54,758	73,051	154,081	Cont	TBD

*Note: DMSP and previous DMSP Block 6 RDT&E funds are found in PE #0305160F, Defense Meteorological Satellite Program. DMSP Block 6 funds have been separated out into a single PE to distinguish between the current DMSP program and the follow-on program.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Defense Meteorological Satellite Program (DMSP) is a fully operational Joint-Service program which supports all military services. The Block 6 program is the replacement Block of satellites for the DMSP Block 5D-3. Block 6 is expected to be required in the early 2000's. Operational commanders require timely, quality weather information to effectively employ weapon systems and protect DOD resources. DMSP, and the follow-on Block 6, is the DOD's most important source of global weather data. It provides visible and infrared cloud cover imagery (1/3 nm constant resolution) and other meteorological, oceanographic, and solar-geophysical information. These data are required over the entire earth in support of strategic and tactical operations. At least two satellites are required in sun synchronous 450nm polar orbit at all times (sun synchronous means the satellites cross the equator at the same local sun time on each of their 14 orbits/day). The DMSP Block 6 program is expected to be in Demonstration/Validation in FY95.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1 (U) Project 4056, DMSP Block 6: This project includes the DMSP Block 6 spacecraft and sensors; ground command, control and communications (C3) facilities and personnel; Air Force strategic, fixed, and transportable, tactical data receipt and processing terminals; and operations and maintenance. All DMSP Block 6 efforts are being conducted to support the convergence of the DOD and DOC polar-orbiting weather satellite programs.

(U) FY 1993 Accomplishments (PE #0305160F):
- (U) Continued to use the Block 6 contracts to assess system capabilities, operational impacts, and to develop cost models for a DOD/DOC merged national weather satellite system.

(U) FY 1994 Plans (PE #0305160F):
- (U) Continue using Block 6 contracts to assess system capabilities, operational impacts, and to develop cost models for a DOD/DOC merged national weather satellite system.

Program Element: #0603434F
PE Title: Defense Meteorological Satellite Program Block 6
Budget Activity: #4. Demonstration/Validation
Old Budget Activity: #6. Defense-Wide Mission Support

Date: February 1994

(U) FY 1995 Plans:
- (U) Meet Air Force Requirements Summit and AFSARC milestone review. ($7.6M)
- (U) System Requirements Review of Block 6 including joint DOD/DOC requirements.

(U) Work Performed By: Development and procurement are managed by AFMC's Space and Missile Systems Center, Los Angeles AFB CA. Prime contractors are: Martin Marietta Astro Space Division, East Windsor, NJ; and Lockheed Missiles & Space Company, Sunnyvale, CA.

(U) Related Activities:
- (U) DMSP is a Joint-Service program in accordance with the MOA, 15 Dec 76. The Air Force is the Executive Agent with responsibility for the Space, C3, and Air Force User Segments. Each Service funds its own User Segment and any Service-unique changes to other segments.
- (U) Close coordination is maintained with the civilian weather satellite programs of the DOC. The DOD and DOC systems have different missions and sensors. Interchange of technology and joint efforts have been continuous with special emphasis on spacecraft bus commonality and avoiding duplication of effort. Efforts are underway to assess feasibility of consolidating DOD/DOC and NASA requirements as part of Block 6 efforts.
- (U) Navy and Army provide funds for service specific Block 6 studies.
- (U) There is no unnecessary duplication of effort within the Air Force or the DOD.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603438F
PE Title: Satellite Systems Survivability
Budget Activity: #4 - Dem/Val
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
2611 Technology Insertion Planning and Analysis								
2,350	448	0	0	0	0	0	Continues	Continues
2612 Prototype Demonstrations								
2,776	3,008	8,351	8,234	7,416	4,817	5,513	Continues	Continues
2613 Component-level Technology Applications								
0	849	0	0	0	0	0	Continues	Continues
Total								
5,390	4,305	8,351	8,234	7,416	4,817	5,153	Continues	Continues

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program performs critical survivability planning, modelling, analysis, concept evaluations and technology prototyping to meet current and projected military space system survivability requirements. Develops and demonstrates technologies and prototype hardware and software, as well as operational procedures, strategy, and tactics that will provide survivability capabilities for military space systems to meet both current and future threats. The program is structured to provide a balanced development of survivability capabilities for the space, ground, and communications segments of space systems. Since space system life cycles are long and systems cannot be modified once on orbit, survivability must be incorporated early in the design process. Failure to protect our space systems could result in the denial of their critical support to the National Command Authorities and our military forces during crisis and conflict. The major prototyping efforts of this program are Technology for Autonomous Operational Survivability (TAOS) and the Miniaturized Satellite Threat Reporting System (MSTRS). TAOS is a free-flying space demonstration of several autonomy and survivability technologies. MSTRS will also be an on-orbit demonstration, but with a focus on threat detection, characterization, and reporting. It will be composed of a suite of modular sensors which could be tailored for application in a wide range of configurations. Technologies from this program are timed and planned for transition to specific satellite program offices for system level implementation. These efforts demonstrate and validate advanced development prototype designs prior to EMD.

Program Element: #0603438F
PE Title: Satellite Systems Survivability
Budget Activity: #4 - Dem/Val
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2611, Technology Insertion Planning and Analysis:
Planning, modelling, and analysis to meet current and projected space system survivability requirements versus both natural and hostile attack environments. Develops and applies software models and tools to evaluate and validate satellite survivability environmental responses and interactions to perform space asset survivability/vulnerability assessments. This activity is intended to provide the basis for identifying systems vulnerabilities and technology gaps.

(U) FY 1993 Accomplishments:
- (U) Completed a twenty-year survivability technology insertion roadmap, in conjunction with Air Force Space Command's Space Control Mission Area Long Range Plan, ensuring consistency with satellite operator and system program office priorities and schedules ($1.9M).
- (U) Continued low level effort to develop and refine modeling and analysis tools; including multiple threat effects and enhanced satellite fidelity ($.5M).

(U) FY 1994 Plans:
- (U) Refine survivability simulation and modelling tools. Incorporate potentially unique, non-standard survivability techniques into the models ($.5M).
- (U) Update the survivability technology insertion roadmap and investment strategy as required. This is a continuing activity. As satellite systems survivability deficiencies are identified and validated, funding is programmed.

(U) FY 1995 Plans: Not Applicable.

(U) Work Performed By: Space and Missile Systems Center (SMC), Los Angeles, CA, has overall management responsibility. Aerospace Corp., Los Angeles, CA, provides technical assistance.

(U) Related Activities:
- (U) Program Element #0603218C, BMDO Research and Support Activities
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603438F
PE Title: Satellite Systems Survivability
Budget Activity: #4 - Dem/Val
Old Budget Activity:#6 - Defense Wide Mission Support

Date: February 1994

2. (U) Project 2612, Prototype Demonstrations: Develops satellite survivability technology prototypes and operational concepts to meet current and projected space system survivability validated mission requirements. Technology for Autonomous Operational Survivability (TAOS) and Miniaturized Satellite Threat Reporting System (MSTRS) are the major efforts.

(U) FY 1993 Accomplishments:
- (U) Completed TAOS development and began spacecraft/payload integration and testing ($2.8M).
- (U) Completed MSTRS concept study, requirements and draft system specification ($.4M).

(U) FY 1994 Plans:
- (U) Launch TAOS on Space Test Experiment Platform (STEP) Mission 0 using DARPA's Taurus launch vehicle and conduct on-orbit demonstrations of TAOS; begin TAOS payload mission analysis ($3M).

(U) FY 1995 Plans:
- (U) Complete TAOS on-orbit operations, analysis and reporting ($2M).
- (U) Begin MSTRS subcomponent and functional brass-board prototype Government Lab in-house and subcontract efforts ($6.4M).

(U) Work Performed By: TAOS: Phillips Laboratory, Albuquerque, NM, manages the TAOS project. The TAOS payload contracts are with: Microcosm, Torrance, CA; GTE, Mountain View, CA; Honeywell, Phoenix, AZ; Rockwell, Anaheim, CA; TRW, Redondo Beach, CA; Intelligent Interactive Imagery Corp, Foster City, CA; and Sandia National Laboratory, Albuquerque, NM. MSTRS: Space and Missile Systems Center, Los Angeles, CA, manages the MSTRS project. Phillips Laboratory, Albuquerque, NM; Sandia National Laboratory, Albuquerque, NM; and Los Alamos National Laboratory, Los Alamos, NM provide technical support. The Aerospace Corporation, Los Angeles, CA, provides system engineering support.

(U) Related Activities:
- (U) Program Element #0604711F, Systems Survivability
- (U) Program Element #0603218C, BMDO Research and Support Activities
- (U) Program Element #0603410F, Space Systems Environmental Interactions Technology.
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

Program Element: #0603438F
PE Title: Satellite Systems Survivability
Budget Activity: #4 - Dem/Val
Old Budget Activity: #6 - Defense Wide Mission Support

Date: February 1994

3. (U) Project 2613, Component-level Technology Applications: Develops and demonstrates critical technologies to improve survivability of space, ground, and communications segments of space systems. Objective is to ready critical technology component-level efforts for insertion into prototype system demonstrations.

(U) FY 1993 Accomplishments: N/A.

(U) FY 1994 Plans:
- (U) Component-level technology applications critical to overcoming vulnerabilities to disruption or degradation. This is a continuing activity. As satellite systems survivability deficiencies are identified and validated, funding is programmed ($.8M).

(U) FY 1995 Plans: Not Applicable.

(U) Work Performed By: Space and Missiles Systems Center, Los Angeles, CA oversees the project, Aerospace Corp., Los Angeles, CA, provides technical assistance. Wright Laboratory, Phillips Laboratory, and Rome Laboratory conduct/manage technology demonstrations in this project.

(U) Related Activity:
- (U) Program Element #0603401F, Advanced Spacecraft Technology
- (U) Program Element #0603211F, Aerospace Structures and Materials
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

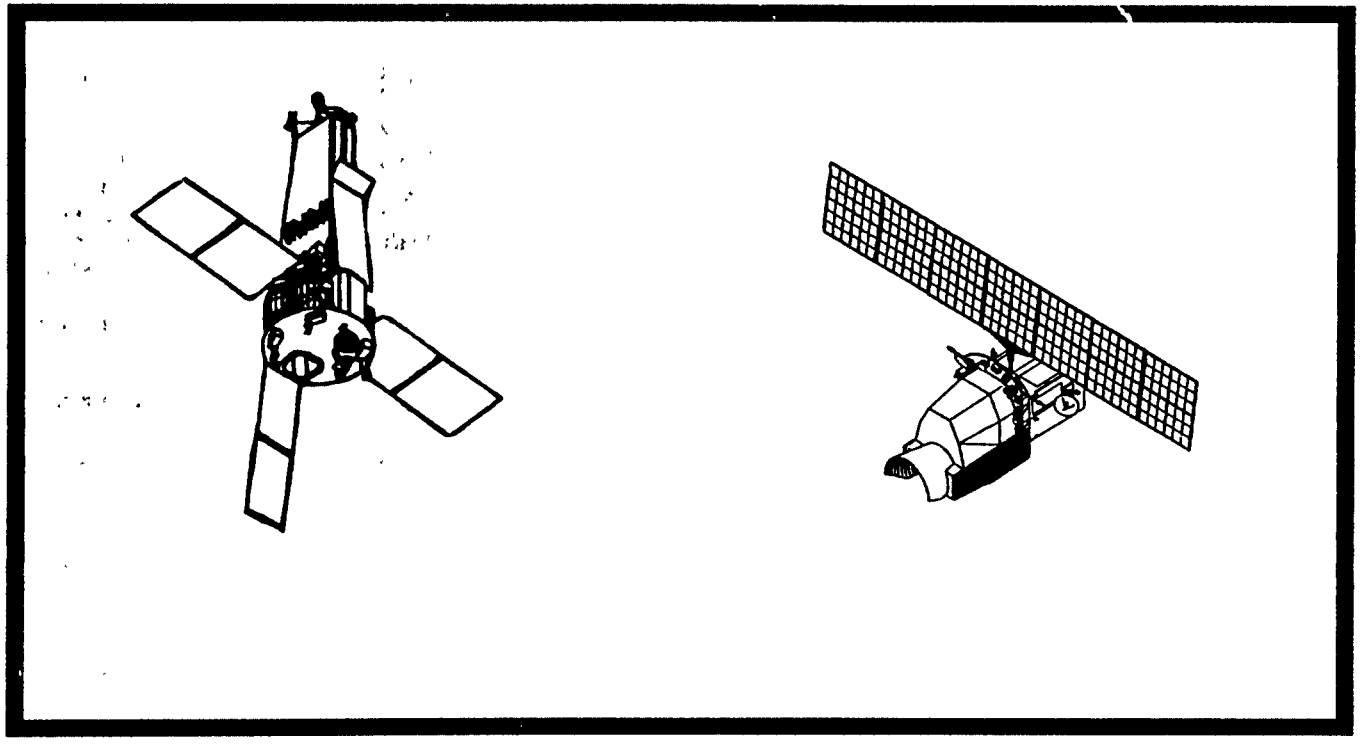
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #63441F
PE Title: Advanced Space-Based TW/AA System (ASB TW/AA)

Project Number: 3616
Budget Activity: 3-Demonstration/Validation
Old Budget Activity: 3-Strategic Programs

DATE: February, 1994

Project Title: Advanced Space-Based TW/AA Systems (Formerly FEWS)



Program Element: 63441F
PE Title: Advanced Space Based TW/AA
Project Number: 3616
Budget Activity: 3 - Strategic Prgograms
Date: February, 1994

A. (U) SCHEDULE/BUDGET INFORMATION ($in thousands)

SCHEDULE	FY 1993	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	To Complete
Program Milestones		Req'ts Devel				MS II DAB		
Engineering Milestones				SRR	SDR		PDR	
T&E Milestones								
Contract MS		RFP Devel	D/V ATP			EMD ATP		
BUDGET ($000)	FY 1993	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	Budget Total (To Complete)
Major Contract	0	0	110,000	138,000	115,000	240,000	455,000	Continuing
Support Contract	0	0	24,000	26,000	20,000	25,000	25,000	Continuing
In House Contract	0	0	14,500	14,500	13,500	18,000	18,000	Contiuning
GFE/Other	0	0	1,500	1,500	1,500	2,000	2,000	Continuing
Total	0	0	150,000	180,000	150,000	285,000*	500,000*	Continuing

*funding in PE0604441F (Advanced Space Based TW/AA - EMD)

Program Element: #63441E
PE Title: Advanced Space-Based TW/AA System (ASBTW/AA)
Project Number: 3616
Budget Activity: 3-Demonstration/Validation
Old Budget Activity: 3-Strategic Programs
DATE: February, 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The purpose of the ASBTW/AA program is to select and develop a satellite which provides increased performance over the existing Defense Support Program (DSP) satellite. The ASBTW/AA spacecraft primary mission is to provide initial warning of a ballistic missile attack on the US. The ASBTW/AA satellite will incorporate new technologies that would enhance detection and provide direct reporting of ICBM/SLBM launches and improve space based surveillance of tactical ballistic missile launches worldwide. This program is in the demonstration/validation research category since it funds the demonstration/validation phase of ASB TW/AA. (Will enter EMD phase in FY98)

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   -(U) No activity in FY93

2. (U) FY 1994 Planned Program:
   - (U) RFP Development ($0)
   - (U) ORD Development ($0)

3. (U) FY 1995 Planned Program:
   - (U) Award Two Dem/Val Contracts ($110 million)
   - (U) Continue Space Based Infrared Technology Projects($ 24 million)
     -- (U) Work started under FEWS program includes computer processing technology efforts, advanced optics , and advanced sensor concepts
   - (U) Continue program office activities/plan EMD/etc ($16 million)

4. (U) Program to Completion:
   (U) - Continue Dem/Val contracts
   (U) -- System Requirements Review (Feb 96)

Program Element: #63441F
PE Title: Advanced Space-Based TW/AA System (ASBTW/AA)
Project Number: 3616
Budget Activity: 3-Demonstration/Validation
Old Budget Activity: 3-Strategic Programs
DATE: February, 1994

- (U) Continue Space Based Infrared Technology
- (U) Continue program office activities/plan EMD etc

D. (U) Work Performed By:

- Program managed by AF PEO for Space and the Space Based Early Warning Systems Program office at Los Angeles Air Force Base. Aerospace Corporation supports the program office.
- ASB TW/AA contractors To be determined though full and open competition

E. (U) COMPARISON WITH FY 1993 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: Not Applicable.

F. (U) PROGRAM DOCUMENTATION:

- (U) FEWS Statement of Operational Need (SON), 29 Jul 88.
- (U) System Operational Requirements Document (SORD), 9 Aug 91.
- (U) Joint Requirements Oversight Council Memorandum (JROC M-057-091), 18 Oct 91.
- (U) Program Management Decision, 10 Nov 93 (Canceled FEWS, initiated ASB TW/AA program)

Program Element: #63441F
PE Title: Advanced Space-Based TW/AA System (ASBTW/AA)
Project Number: 3616
Budget Activity: 3-Demonstration/Validation
Old Budget Activity: 3-Strategic Programs
DATE: February, 1994

G. (U) RELATED ACTIVITIES:
- (U) PE #0102431F (Defense Support Program).
- (U) PE #0305911F (Space Activities).
- (U) PE #0603425F (Follow-on Early Warning System).
- (U) PE #0305144F/0305171F (Titan Space Boosters/Space Launch Support).
- (U) PE #0102310F/0102313F (Cheyenne Mountain Upgrade Programs/Integrated TW/AA System).
- (U) PE #0305110F/0305151F (AF Satellite Control Network).
- (U) PE #0912011F (Construction Planning and Design).
- (U) PE#0305905F (Improved Space Based TW/AA)
- (U) PE #0604441F (Advanced Spaced Based TW/AA - EMD)
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)
Not Applicable

T&E ACTIVITY (TO COMPLETION)

Event	Planned Date	Remarks
DT&E/IOT&E	3QFY04 to 3QFY05	On-orbit testing of first satellite

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603601F
PE Title: Conventional Weapons Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
670A Ordnance Technology	11,267	12,647	22,450	19,941	20,784	20,644	19,687	Cont	TBD
670B Guidance Technology	8,400	4,720	12,650	10,825	10,610	11,200	11,385	Cont	TBD
670E Air-to-Air Guidance Technology	1,030	0*	0	0	0	0	0	Cont	TBD
4168 Precision Strike	3,560	0	0	0	0	0	0	0	3,560
Total	24,257	17,367	35,100	30,766	31,394	31,844	31,072	Cont	TBD

* FY 1994 funding denied by Congress

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Science and Technology effort is the Air Force Advanced Development program for air-to-surface and air-to-air weapons including guidance, ordnance, and aeromechanics technologies. This program develops the following technologies: autonomous, adverse-weather advanced guidance seekers; fuzes; insensitive and less sensitive explosives; hard target warheads; explosives, bombs, submunitions, and their dispensing mechanisms; guns and ammunition; air-to-surface composite weapon airframes; smart submunitions; weapon ordnance subsystems; and instrumentation. Hardware/software for advanced technologies are developed and evaluated to determine effectiveness and potential operational value.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 670E, Air-to-Air Guidance Technology: This project develops and demonstrates advanced air-to-air guidance technologies. The emphasis is on short- to medium-range weapons against future threats with evading/maneuvering characteristics. Objectives include detection and "lock-on" of reduced signature targets, improved countermeasure performance, autonomous seeker operation, and precision guidance. These technical goals will allow for reduced miss distances, adverse-weather operation, increased tactical mission options, improved survivability, more reliable system operation, and enhanced affordability. Efforts are focused on a multi-spectral seeker which combines dual radio frequency (RF) guidance technologies. Project 670E is incorporated into Project 670B for FY 1995 and beyond.

Program Element: #0603601F
PE Title: Conventional Weapons Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Continued to develop and demonstrate advanced technologies and algorithms for air-to-air seekers for preplanned product improvements of current missiles and for the next generation air superiority missiles. ($830K)
- (U) Continued to develop and demonstrate affordable, reliable components for the next generation air superiority missiles. ($200K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by Wright Laboratory, Eglin AFB, FL. Work has stopped due to Congressional direction.

(U) Related Activities:
- (U) PE 0602602F, Conventional Munitions.
- (U) PE 0602111N, Anti-Air/Anti-Surface Warfare Technology.
- (U) PE 0603792N, Advanced Technology Demonstrations.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 4168, Precision Strike: This FY 1993 project demonstrated the accuracy of an Inertial Navigation System/Global Positioning System (INS/GPS)-equipped weapon. The project was completed in FY 1993.

(U) FY 1993 Accomplishments:
- (U) Completed the integration and free-flight demonstration of an INS/GPS-guided weapon. ($3,560K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This program is managed by Wright Laboratory, Eglin AFB, FL.

Program Element: #0603601F
PE Title: Conventional Weapons Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) Related Activities:
- (U) PE 0602602F, Conventional Munitions.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603601F
PE Title: Conventional Weapons Technology
Project Number: 670A
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

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

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Ordnance Technology	11,287	12,647	22,450	19,941	20,784	20,644	19,687	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Advanced Development project develops and demonstrates the feasibility, effectiveness, and operational utility of conventional (non-nuclear) ordnance technologies for current and future air-delivered weapons. Project develops the following technologies: fuzes; insensitive and less sensitive explosives; hard target warheads; explosives, bombs, submunitions, and their dispensing mechanisms; guns and ammunition; air-to-surface composite weapon airframes; smart submunitions; weapon ordnance subsystems; and instrumentation. Increase in FY 1995 funding over FY 1994 level is due to: increased priority in finding affordable technology options for increased munitions safety; increased operational effectiveness against high value buried and hardened targets; more effective submunition dispensing; increased tactical mission choices; and improved air intercept missile ordnance performance.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Continued to develop advanced air-delivered munition and submunition technologies for components, subsystems, and systems to increase performance, lethality, safety, affordability, and supportability. ($4,058K)
   - (U) Continued to demonstrate advanced ordnance, weapon airframe and carriage, and instrumentation technologies for air-to-air and air-to-surface munitions and submunitions to demonstrate operational effectiveness. ($7,209K)

2. (U) FY 1994 Planned Program:
   - (U) Develop advanced air-delivered munition and submunition technologies for components, subsystems, and systems to increase performance, lethality, safety, affordability, and supportability. ($6,230K)
   - (U) Demonstrate advanced ordnance, weapon airframe and carriage, and instrumentation technologies for air-to-air and air-to-surface munitions and submunitions to demonstrate operational effectiveness. ($6,417K)

3. (U) FY 1995 Planned Program:
   - (U) Develop advanced air-delivered munition and submunition technologies for components, subsystems, and systems to increase performance, lethality, safety, affordability, and supportability. ($11,570K)

Program Element: #0603601F
PE Title: Conventional Weapons Technology
Project Number: 670A
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

- (U) Demonstrate advanced ordnance, weapon airframe and carriage, and instrumentation technologies for air-to-air and air-to-surface munitions and submunitions to demonstrate operational effectiveness. ($10,880K)

4. (U) Program To Completion: This is a continuing program.

D. (U) WORK PERFORMED BY: This program is managed by Wright Laboratory, Eglin AFB, FL. Major contractors are: McDonnell Douglas, St. Louis, MO; Lockheed Missile and Space, Sunnyvale, CA; Motorola Inc., Scottsdale, AZ; Raytheon Missile Systems, Bedford, MA; and General Electric Co., Burlington, VT.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
- (U) TAF SON 335-88, Advanced Capability Anti-Radiation, 6 Jun 90.
- (U) TAF SON 317-87, Advanced Attack Weapon, 16 May 89.
- (U) TAF SON 306-85, Multi-Purpose All-Up Round Development, 24 Mar 87.
- (U) TAF SON 309-88, Reducing the Risk of Munitions Operations, 22 May 89.
- (U) TAF SON 303-85, Hardened Target Munitions, 20 May 85.

G. (U) RELATED ACTIVITIES:
- (U) PE 0602602F, Conventional Munitions.
- (U) PE 0602111N, Anti-Air/Anti-Surface Warfare Technology.
- (U) PE 0603792N, Advanced Technology Demonstrations.
- (U) PE 0604407D, Joint Standoff Weapon.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

Program Element: #0603601F
PE Title: Conventional Weapons Technology

Project Number: 670A
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

J. (U) MILESTONE SCHEDULE:

1.	(U) Complete missile warhead package ground test evaluation	Mar 94
2.	(U) Test dual-mode launcher	Jul 94
3.	(U) Complete preliminary design of Boosted Penetrator	Sep 94
4.	(U) Initiate flight demonstration of low-cost navigation/control technologies for weapon airframes	Dec 94
5.	(U) Complete multi-mode warhead component testing	Sep 95
6.	(U) Complete sled track test of Booster Penetrator	Jul 90

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603601F
PE Title: Conventional Weapons Technology
Project Number: 670B
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development
Date: February 1994

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

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
Guidance Technology	8,400	4,720	12,650	10,825	10,610	11,200	11,385	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Advanced Development project develops and demonstrates affordable, autonomous, and adverse-weather advanced guidance technologies for conventional air-to-air and air-to-surface armament. Objectives include: increased accuracy, adverse-weather operation; real-time targeting and battle damage assessment (BDA); enhanced target classification/ identification; standoff delivery munitions; detection and "lock-on" of reduced signature targets; improved survivability; more reliable system operation; improved countermeasure performance; and enhanced affordability. Increase in FY 1995 funding over FY 1994 level is due to the incorporation of Project 670E into this project.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Continued to develop and demonstrate affordable, autonomous, and adverse-weather advanced guidance seekers. ($2,500K)
   - (U) Continued to develop and demonstrate technologies for real-time targeting of advanced guidance seekers. ($4,900K)
   - (U) Continued to develop technologies that can distinguish enemy forces from friendly forces and provide real-time BDA. ($1,000K)

2. (U) FY 1994 Planned Program:
   - (U) Develop and demonstrate affordable, autonomous, and adverse-weather advanced guidance seekers. ($2,320K)
   - (U) Develop and demonstrate technologies for real-time targeting of advanced guidance seekers. ($1,400K)
   - (U) Develop technologies to distinguish enemy forces from friendly forces and provide real-time BDA. ($1,000K)

3. (U) FY 1995 Planned Program:
   - (U) Develop and demonstrate affordable, autonomous, and adverse-weather advanced guidance technologies that can distinguish enemy forces from friendly forces and provide real-time BDA. ($9,150K)
   - (U) Develop and demonstrate technologies for real-time targeting of advanced guidance seekers. ($2,000K)
   - (U) Develop and demonstrate advanced guidance technologies and affordable, reliable components to counter the next generation airborne threats. ($1,500K)

Program Element: #0603601F
PE Title: Conventional Weapons Technology
Project Number: 670B
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

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

D. (U) WORK PERFORMED BY: This program is managed by Wright Laboratory, Eglin AFB, FL. Major contractors are: Hughes Missile Systems Company, San Diego, CA; Raytheon Corp., Bedford, MA; and Loral, Phoenix, AZ.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
- (U) TAF System Operational Requirement Document 009-76, Advanced Medium Range Air-to-Air Missile, 15 Jan 90.
- (U) SAC/TAF Mission Need Statement 401-91, Joint Direct Attack Munition, 4 Nov 91.
- (U) Joint Operational Requirement Document (Draft), Joint Standoff Weapon, 25 Aug, 92.
- (U) TAF Mission Need Statement 401-91, Adverse Weather Precision Strike Capability Mission Need Statement, 5 Mar 92.

G. (U) RELATED ACTIVITIES:
- (U) PE 0602111N, Anti-Air/Anti-Surface Warfare Technology.
- (U) PE 0603792N, Advanced Technology Demonstrations.
- (U) PE 0604618F, Joint Direct Attack Munitions.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE:

1. (U)	Complete captive flight testing of the autonomous synthetic aperture radar (SAR) seeker	Mar 94
2. (U)	Complete concept analysis for a SAR seeker direct attack scenario	Mar 95
3. (U)	Complete advanced technology ladar seeker affordability and performance improvements	Aug 95
4. (U)	Complete initial operational testing for the two-color wideband infrared scene projector system	Sep 96
5. (U)	Complete integration of image processor with image algebra algorithms	Sep 96

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603605F
PE Title: Advanced Weapons Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
3150 Advanced Optics Technology	27,430	34,640*	5,000	5,000	5,200	4,700	5,100	Cont	TBD
3151 High Power Semiconductor Laser Technology	12,353	10,250	6,348	6,900	6,900	6,000	6,100	Cont	TBD
3152 High Power Microwave (HPM) Technology	9,860	20,000*	11,500	11,000	11,300	10,100	10,300	Cont	TBD
3277 Systems Survivability Technology	260	300	0	0	0	0	0	0	1,800
3647 High Energy Laser Technology	31,348	28,500*	36,652	33,220	33,968	30,866	27,215	Cont	TBD
Total	81,251	93,690	59,500	56,120	57,368	51,666	48,715	Cont	TBD

* Congress added $20,000K for excimer laser technology ($10,000K in Project 3150, $8,500K in Project 3152, and $1,500K in Project 3647), $18,400K for Laser Radar Field Demonstration (Project 3150), and $900K for HPM technology (Project 3152).

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program element demonstrates advanced directed energy and optical imaging concepts. Speed-of-light weapons and long-range, high resolution optical imaging through the turbulent atmosphere offer significant payoffs for many Air Force missions. This program has demonstrated many major technology breakthroughs such as removing atmospheric distortions from optical transmissions (e.g., laser beams) and in producing small, relatively high-power laser diode phased arrays. Major emphasis areas include: HPM and high energy laser technologies; optical imaging (e.g., space object identification); and laser diode arrays.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 3150, Advanced Optics Technology: This project develops advanced optical technologies for imaging distant or dim objects. This work supports high energy laser technologies since an imaging subsystem is required for target verification, accurate and sustainable laser beam placement on target, and damage assessment. Advanced technologies including

Program Element: #0603605F
PE Title: Advanced Weapons Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

nonlinear optics, adaptive optics, and specialized signal processing are being developed. The goal is high quality optical image reconstruction, concentrating on removing turbulent atmosphere-induced distortions. Many of these developed technologies (both techniques and hardware) also have significant application to astronomy research.

(U) FY 1993 Accomplishments:
- (U) Continued advanced optical imaging technology development and demonstrations that support applications such as space object identification (SOI). ($2,580K)
- (U) Continued development of non-linear optics (NLO) technologies for nonmechanical corrections in optical imaging. ($1,100K)
- (U) Continued development of high resolution sensors and image reconstruction techniques for applications such as SOI. ($1,170K)
- (U) Continued upgrades/demonstrations at the Air Force Maui Optical Site (AMOS). ($250K)
- (U) Continue development of NLO applications for diode-pumped solid state lasers. ($730K)
- (U) Continued development of the excimer-based active imaging technology. ($10,000K)
- (U) Began developing Laser Imaging Detection and Ranging (LIDAR) range-doppler imaging receiver. ($11,600K)

(U) FY 1994 Planned Program:
- (U) Continue advanced optical imaging technology development and demonstrations that support applications such as SOI. ($2,175K)
- (U) Continue development of NLO technologies for nonmechanical corrections in optical imaging. ($1,850K)
- (U) Continue development of sensors and image reconstruction techniques for applications such as SOI. ($1,250K)
- (U) Continue upgrades/demonstrations at AMOS and the Malabar, FL, optical site. ($425K)
- (U) Continue development of NLO technologies for diode-pumped solid state lasers. ($540K)
- (U) Continue development of the excimer-based active imaging technology. ($10,000K)
- (U) Continue development of the LIDAR field demonstration. ($18,400K)

(U) FY 1995 Planned Program:
- (U) Continue advanced optical imaging technology development and demonstrations that support applications such as SOI. ($1,885K)
- (U) Continue development of NLO technologies for nonmechanical corrections in optical imaging. ($1,400K)
- (U) Continue development of high resolution sensors and image reconstruction techniques for applications such as SOI. ($950K)
- (U) Continue upgrades/demonstrations at AMOS and the Malabar, FL, optical site. ($565K)
- (U) Continue development of NLO technologies for diode-pumped solid state lasers. ($200K)

Program Element: #0603605F
PE Title: Advanced Weapons Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) Work Performed By: The Phillips Laboratory, Kirtland AFB, NM, manages the program. The major contractors are: ATA Corporation, Albuquerque, NM; Rockwell Power Services Company, Albuquerque, NM; RDA-Logicon, Marina del Rey, CA; S Systems Corporation, Inglewood, CA; and the University of Arizona Optical Sciences Center, Tucson, AZ.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602601F, Phillips Laboratory.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 3151, High Power Semiconductor Laser Technology: This project continues to yield revolutionary breakthroughs in compact, robust, affordable laser system technology, which is being developed and transitioned for a wide range of military applications requiring small compact laser sources with low to moderate optical power. Near-term applications include compact, reliable infrared sources for use with night vision systems, battlefield surgery, and covert communication systems. Longer term applications, up to and including weapon applications, focus on compact higher power sources. This project leads development and builds upon a wide range of commercial advancements. Commercially available semiconductor lasers (1/10 watt) are widely used due to their low-cost, small size and weight, high reliability, and high efficiency in converting electricity to laser energy. The project preserves these attractive features while scaling to the higher powers (one to ten watts and above) and/or military application-specific wavelengths required for future electro-optical countermeasure systems. The project is divided into four technology areas. First, it investigates methods to increase output power from individual semiconductor laser diodes. Second, it develops individual laser and semiconductor laser array integration methods, which produce a single, high quality laser beam at significantly higher power levels. Third, it develops wavelength-specific laser diodes for military applications. Fourth, it develops advanced high power diode-pumped solid state laser systems. This project also works directly with field users to develop proof of capability demonstrations and field tests for these revolutionary laser sources. This technology has many commercial applications, especially for eye-safe lasers.

(U) FY 1993 Accomplishments:
- (U) Continued development of laser diodes for improved performance/higher power in single diode and array applications. ($2,203K)
- (U) Demonstrated miniature relatively high power laser diode arrays suitable for many applications such as illuminators. ($4,575K)

Program Element: #0603605F
PE Title: Advanced Weapons Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) Continued development of high power laser diodes at alternate wavelengths that will be transitioned to military applications such as infrared countermeasures. ($3,775K)
- (U) Continued development of diode-pumped solid state lasers for near-term moderate power applications that do not require extremely compact sources. ($1,400K)
- (U) Continued to investigate applications for these advanced semiconductor laser diodes and diode arrays. ($400K)

(U) FY 1994 Planned Program:
- (U) Continue development of laser diodes for improved performance/higher power in single diode and array applications. ($1,300K)
- (U) Demonstrate miniature high power laser diode arrays suitable for many applications such as illuminators. ($2,750K)
- (U) Continue development of high power laser diodes at alternate wavelengths that will be transitioned to military applications such as infrared countermeasures. ($4,500K)
- (U) Continue development of diode-pumped solid state lasers for near-term moderate power applications that do not require extremely compact sources. ($1,400K)
- (U) Continue to investigate applications for these advanced semiconductor laser diodes and diode arrays. ($300K)

(U) FY 1995 Planned Program:
- (U) Continue development of laser diodes for improved performance/higher power in single diode and array applications. ($1,250K)
- (U) Demonstrate miniature relatively high power laser diode arrays suitable for many applications such as illuminators. ($2,425K)
- (U) Develop high power laser diode arrays at alternate wavelengths that will be transitioned to military applications such as infrared countermeasures. ($973K)
- (U) Continue development of diode-pumped solid state lasers for near-term moderate power applications that do not require extremely compact sources. ($1,400K)
- (U) Continue to investigate applications for these advanced semiconductor laser diodes and diode arrays. ($300K)

(U) Work Performed By: The Phillips Laboratory, Kirtland AFB, NM, manages the program. The major contractors are: McDonnell Douglas, St. Louis, MO; SRI, David Sarnoff Research Center, Princeton, NJ; Hughes Research Laboratories, Malibu, CA; Spectra Diode Laboratories Incorporated, San Jose, CA; and Hughes-Danbury Optical Systems, Danbury, CT.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602204F, Aerospace Avionics.

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- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0602234N, Systems Support Technology.
- (U) Representatives from Army, Navy, Ballistic Missile Defense Organization, National Laboratories, and Air Force using commands are members of the government review team for this technology.
- (U) Joint field demonstrations of this technology are ongoing with: the Air Force Pararescue School; the Air Force Special Operations Command; the U.S. Coast Guard; and the U.S. Customs Service.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3277, Systems Survivability Technology: This project develops technologies to evaluate and enhance Air Force systems electromagnetic pulse survivability. The project has been terminated after FY 1994.

(U) FY 1993 Accomplishments:
- (U) Demonstrated technologies for simulating electromagnetic pulses. ($260K)

(U) FY 1994 Planned Program:
- (U) Demonstrate technologies for simulating electromagnetic pulses. ($300K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: The Phillips Laboratory, Kirtland AFB, NM, manages the program. No contracts have been awarded.

(U) Related Activities:
- (U) PE 0604711F, Systems Survivability (Nuclear Effects).
- (U) PE 0602715H, Defense Nuclear Agency.
- (U) PE 0604747F, Electromagnetic Radiation Test Facilities.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603605F
PE Title: Advanced Weapons Technology

Project Number: 3152
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
High Power Microwave (HPM) Technology	9,860	20,000*	11,500	11,000	11,300	10,100	10,300	Cont	TBD

* $8,500K of the Congressional add for excimer laser technology and the $900K HPM add are in this project.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Advanced Development project develops HPM generation technologies. It also develops a susceptibility/vulnerability/lethality data base to identify potential vulnerabilities of U.S. systems to HPM threat parameters and to provide a basis for future weaponization decisions. Representative U.S. and foreign assets will be tested to understand real system susceptibilities. Both wideband (wide frequency range) and narrow band (very small frequency range) technologies are being developed.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Continued technology development of generic HPM hardware. ($3,760K)
   - (U) Continued efforts evaluating the susceptibility of military hardware and software to HPM. ($1,000K)
   - (U) Continued efforts addressing aircraft self-protection technologies including technology development for wideband sources. ($4,000K)
   - (U) Continued efforts on active denial technology. ($1,100K)

2. (U) FY 1994 Planned Program:
   - (U) Continue technology development of generic HPM hardware. ($2,865K)
   - (U) Continue efforts evaluating the susceptibility of military hardware and software to HPM. ($500K)
   - (U) Begin efforts addressing suppression of enemy air defense systems including development of a narrow band source and conducting susceptibility experiments for burnout of internal electronics. ($1,820K)
   - (U) Continue efforts addressing aircraft self-protection technologies including technology development for wideband sources. ($5,015K)
   - (U) Complete critical experiment on active denial technology. ($1,300K)

Program Element: #0603605F
PE Title: Advanced Weapons Technology
Project Number: 3152
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

- (U) Continue development of the laser induced microwave effects (LIME) program using excimer laser technology (from Project 3647). ($8,500K)

3. (U) FY 1995 Planned Program:
   - (U) Continue technology development of generic high power microwave (HPM) hardware. ($820K)
   - (U) Continue efforts evaluating the susceptibility of representative military hardware and software to HPM effects. ($500K)
   - (U) Continue efforts addressing suppression of enemy air defense systems including development of a narrow band source and conducting susceptibility experiments for burnout of internal electronics. ($2,250)
   - (U) Continue efforts addressing aircraft self-protection technologies including technology development for wideband sources. ($4,630K)
   - (U) Begin advanced technology transition demonstration on active denial technology. ($1,800K)
   - (U) Continue development of the LIME program using excimer laser technology. ($1,500K)

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

D. (U) WORK PERFORMED BY: The Phillips Laboratory, Kirtland AFB, NM, manages the program. The major contractors are: Maxwell Laboratories, San Diego, CA; Kaman Sciences Corp., Dikewood Division, Albuquerque, NM; Mission Research Corporation, Santa Barbara, CA; Fiore Industries, Albuquerque, NM; and Power Spectra Inc., Sunnyvale, CA.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
   - (U) TAF SON 323-88, Advanced Infrared Countermeasures for Tactical Air Forces Aircraft, 6 Sep 89.
   - (U) TAF SON 341-88, Radio Frequency Countermeasures, 30 Oct 89.
   - (U) SAC SON 010-89, Draft, Bomber Lethal Penetration Aids, 14 Jul 89.
   - (U) MAC SON 007-81, Defensive Systems for Airlifter Aircraft, 24 May 82.
   - (U) SAC MNS 025-87, Denial Systems for Nuclear Weapon Security, Jan 92.

Program Element: #0603605F
PE Title: Advanced Weapons Technology

Project Number: 3152
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

G. (U) RELATED ACTIVITIES:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0602120A, Electronic Survivability and Fuzing Technology.
- (U) PE 0602111N, Anti-Air Warfare, Anti-Surface Warfare Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603605F
PE Title: Advanced Weapons Technology
Project Number: 3647
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

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

Project Title / Popular Name	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
High Energy Laser Technology	31,348	28,500*	36,652	33,220	33,968	30,866	27,215	Cont	TBD

* $1,500K of the Congressional add for excimer laser technology is in this project.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This Advanced Development project develops and demonstrates technology and conducts detailed assessments needed for high energy laser (HEL) weapons. The technology developed by this project is directly applicable to most high power applications. The project demonstrates the critical technologies for: (1) scalable laser devices; (2) optical components; and (3) laser beam control to efficiently compensate and propagate the laser radiation through the atmosphere to a target. It also develops and uses detailed computational models to establish HEL weapon effectiveness and satellite and missile vulnerability. Correcting the laser beam for atmospheric disturbances is the key technology in most HEL applications. The beam control technology developed in this project had, and will continue to have, a significant benefit to the astronomy community.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   - (U) Continued development and demonstration of HEL device components for potential weapon applications. ($3,728K)
   - (U) Continued atmospheric compensation/beam control experiments to support applications such as weaponization and space object identification. ($7,090K)
   - (U) Continued atmospheric measurements to support increased transmission of HEL beams. ($4,000K)
   - (U) Began development of next generation adaptive optics for the 3.5 meter telescope. ($500K)
   - (U) Continued HEL target vulnerability assessments. ($2,170K)
   - (U) Continued development of HEL optical components. ($632K)
   - (U) Demonstrated high performance optical coatings, suitable for near-term HEL applications. ($700K)
   - (U) Continued development of excimer laser technology for the laser induced microwave effects program. ($10,000K)
   - (U) Completed installation and integration of the 3.5 meter telescope. ($2,528K)

Program Element: #0603605F
PE Title: Advanced Weapons Technology
Project Number: 3647
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development
Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) Continue development and demonstration of high energy laser (HEL) device components for potential weapon applications. ($2,855K)
   - (U) Continue atmospheric compensation/beam control experiments, including first atmospheric compensation experiments on the new 3.5 meter telescope. ($7,864K)
   - (U) Continue atmospheric measurements and characterization of the HEL beam propagation environment from ground and airborne platforms. ($10,227K)
   - (U) Continue fabrication of active tracking hardware for the 3.5 meter telescope. ($1,648K)
   - (U) Continue development of next generation adaptive optics for the 3.5 meter telescope. ($1,000K)
   - (U) Continue vulnerability assessments for potential HEL targets. ($2,581K)
   - (U) Continue development of HEL optical components. ($825K)
   - (U) Continue development of excimer laser technology supporting the laser induced microwave effects program. ($1,500K)

3. (U) FY 1995 Planned Program:
   - (U) Continue development and demonstration of HEL device components for potential weapon applications. ($4,970K)
   - (U) Continue atmospheric compensation/beam control experiments from ground-based platforms to support applications ranging from weaponization to space object identification. ($12,460K)
   - (U) Continue atmospheric measurements and characterization of the HEL beam propagation environment from ground and airborne platforms. ($10,945K)
   - (U) Complete fabrication and installation of active tracking hardware for the 3.5 meter telescope. ($1,200K)
   - (U) Continue development of next generation adaptive optics for the 3.5 meter telescope. ($4,200K)
   - (U) Continue vulnerability assessments for potential HEL targets. ($2,877K)

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

D. (U) WORK PERFORMED BY: The Phillips Laboratory, Kirtland AFB, NM, manages the program. The major contractors are: Textron Defense Systems (Everett Research Laboratory), Everett, MA; Rockwell Power Service Company, Albuquerque, NM; RDA-Logicon, Marina del Rey, CA; Rockwell International, Rocketdyne Division, Canoga Park, CA; and The Optical Sciences Company, Placentia, CA.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

Program Element: #0603605F
PE Title: Advanced Weapons Technology

Project Number: 3647
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

2. (U) SCHEDULE CHANGES: None.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
- (U) AFSPACECOM MNS for Space Control Anti-Satellite (ASAT) Capability, 19 May 88, (S).
- (U) Acquisition Decision Memorandum (ADM), Anti-Satellite Systems, 6 Mar 89, (S).
- (U) USSPACECOM ASAT Concept of Operations (CONOPS), 12 Oct 89, (S).
- (U) Requirements for an ASAT Program, MJCS 201-86, 22 Sep 88, (S).
- (U) USSPACECOM Multicommand Required Operational Capability (MROC) 03-87 for a Space Control ASAT Capability, Joint Chiefs of Staff, SM-77-88, 5 Feb 88, (S).

G. (U) RELATED ACTIVITIES:
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0603319F, Airborne Laser Demonstration.
- (U) PE 0350910F, SPACETRACK.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603617F **Date:** February 1994
PE Title: Command, Control, & Communications (C3) Applications
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity : #5 - Communications Development and Intelligence

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2314 Tactical Air Surveillance								
101	573	951	1,044	1,114	840	484	Cont.	TBD
2317 Tactical Air Information Production & Distribution								
142	3,541	1,174	1,589	4,832	3,329	3,692	Cont.	TBD
2321 Tactical Battle Information Management								
5,567	4,964	2,992	3,551	1,716	3,699	4,039	Cont.	TBD
3804 Tactical Air Forces Systems Integration								
458	191	285	285	280	375	378	Cont.	TBD
Total								
6,268	9,269	5,402	6,469	7,942	8,243	8,593	Cont.	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: Rapidly transitions developments in the Science and Technology base to existing C3 programs or directly to warfighting commands. Projects are directly responsive to operational requirements for improved battle management, communications. theater missile defense, and surveillance capability. Takes advantage of advanced technology developments throughout the services and industry as well as off-the-shelf technology. This research is in Category 6.4, Engineering and Manufacturing Development. Its products are primarily advanced development models, rapid prototype efforts, and software

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developed through evolutionary acquisition methods. Program also defines system architectures and develops communications technology for modernizing and improving the Air Force portion of the Tri-Service communications networks which the Defense Information Systems Agency (DISA) oversees. Beginning in FY 1994, the Tactical Air Information Production and Distribution project includes funding and tasks from PE 0303126F, Long Haul Communications, including the Secure Survivable Communications Network (SSCN). Additional funding supports Theater Missile Defense (TMD) in FY93 and FY94.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 2314, Tactical Air Surveillance: Develops advanced technology and demonstrates equipment improvements to the Tactical Air Control Systems (TACS) ground surveillance radars. Investigates non-radar and/or adjunct radar sensors to address the Tactical Air Forces (TAF) surveillance, detection, and tracking requirements not satisfied by an active radar.

   (U) FY 1993 Accomplishments:
   (U) - Completed solid state transmitter panel development and testing and initiated configuration development for integration of a solid state transmitter into the AN/TPS-75 radar ($0.1M).

   (U) FY 1994 Plans: Same as above.
   (U) - Initiate multiple Sidelobe Canceller/Mainlobe Noise Canceller (MSLC/MNC) development/demonstration for AN/TPS-75 radar ($0.4M).
   (U) - Initiate solid state transmitter panel performance and reliability and maintainability (R&M) testing ($0.2M).

   (U) FY 1995 Plans:
   (U) - Initiate development of adaptive waveform and signal processing improvements ($0.1M).
   (U) - Complete MSLC/MNC development ($0.5M).
   (U) - Complete solid state transmitter panel performance and R&M testing ($0.25M).
   (U) - Initiate signal to noise improvement study and demonstration ($0.1M).

   (U) Work Performed By: All tasks in this program are managed through Rome Laboratories, Griffiss AFB, NY and by Electronic Systems Center, Hanscom AFB, MA. Contractors include: Westinghouse Electric Crop., Baltimore, MD; PAR Government Systems/Sensis Corp., New Hartford, NY/Syracuse, NY; Paramax , Minneapolis, MN; CTA Inc., Falcon

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Date: February 1994

Communications, Colorado Springs, CO; CALSPAN-UB Research Center, Buffalo, NY; Rome Research Corp., Rome, NY; Ford Aerospace and Communication Corp., Colorado Springs, CO; Sterling Software Company, Bellevue, NE; Ford Aerospace Corp., San Jose, CA; Stanford Telecommunications Inc., Reston, VA; Lincoln Labs, Lexington, MA; Harris Corp., Melbourne, FL; Signatron, Inc., Lexington, MA; Motorola, Scottsdale, AZ; Raytheon, Sudbury, MA; National Communications Systems, Washington, DC; MITRE Corp., Bedford, MA; and Computer Engineering Associates, Avon, MA.

(U) Related Activities:
- (U) - PE 0602702F, Command, Control, and Communications
- (U) - PE 0603789F, C3I Advanced Development
- (U) - PE 0207412F, Tactical Air Control System Improvements
- (U) - PE 0603260F, Intelligence Advanced Development
- (U) - PE 0208010F, Joint Tactical Communications
- (U) - PE 0207438F, Theater Battle Management C4I
- (U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2317, Tactical Air Information Production and Distribution: Transitions advanced communications technology in support of Theater Battle Management (TBM) command and control enhancements, including multi-level security (MLS), survivability, and deployability. Project develops systems providing increased survivability, interoperability, and control for communications networks ranging from base communications to the deployed elements of Defense Information System Network (DSN). Project is aimed at demonstrating networking technologies that will support Air Force initiatives to improve theater deployed communications through evolutionary technology acquisition and insertion into the existing operational tactical network. This project serves as a transition vehicle for the technologies being developed under the DoD Global Grid initiative. It specifically deals with the transition of technologies developed under the Theater Extension Network portion of the Global Grid initiative into the Air Force theater deployable communications. Beginning in FY

Program Element: 0603617F
PE Title: Command, Control, & Communications (C3) Applications
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity : #5 - Communications Development and Intelligence

Date: February 1994

1994, this project includes funding and tasks from PE 0303126F, Long Haul Communications, including the Secure Survivable Communications Network (SSCN).

(U) FY 1993 Accomplishments:
(U) - Initiated development planning for integrated multi-level secure communication services ($0.1M).

(U) FY 1994 Plans:
(U) - Initiate a roadmap to transition networking technologies into Air Force needs in Theater Deployable Communications (TDC) ($0.1M).
(U) - Continue development of the Secure Survivable Communications Network (SSCN) initiated under PE 0303126F ($1.5M).
(U) - Install SSCN node at Langley AFB and integrate it into a joint demonstration ($0.2M).
(U) - Continue Development of the International Policy Gateway ($0.3M).
(U) - Continue development of a security CONOPS for interfacing the Defense Message System (DMS) into theater ($0.4M).
(U) - Support Theater Battle Management (TBM) architecture development and simulation ($0.25M).
(U) - Support Theater Deployable Communications (TDC) development activities ($0.75M).

(U) FY 1995 Plans:
(U) - Complete SSCN development and prepare for joint demonstration ($0.5M).
(U) - Continue development of a security CONOPS for interfacing the Defense Message System (DMS) into theater ($0.06M).
(U) - Complete development of the International Policy Gateway and transition to the Theater Deployable Communications (TDC) program ($0.1M).
(U) - Initiate SSCN Phase II for fielding and complete plan for transition into TDC program ($0.5M).

(U) Work Performed By: All tasks in this program are managed through Rome Laboratories, Griffiss AFB, NY and Electronic Systems Center, Hanscom AFB, MA. contractors include Rome Research Corporation, Rome, NY; Stanford Telecommunications Incorporated, Reston, VA; Lincoln Labs, Lexington, MA; Harris Corporation, Melbourne, FL;

Program Element: 0603617F **Date:** February 1994
PE Title: Command, Control, & Communications (C3) Applications
Budget Activity : #4 - Demonstration and Validation
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Signatron Incorporated, Lexington, MA; Motorola, Scottsdale, AZ; Raytheon, Sudbury, MA; National Communications Systems, Washington, DC; MITRE Corporation, Bedford, MA; and Computer Engineering Associates, Avon, MA.

(U) Related Activities: See Project 2314.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2321, Tactical Battle Information Management: This project is the R&D pipeline that feeds efforts to upgrade existing TBM C4I programs. It prototypes an Advanced Planning System (APS) decision aid. APS will supply combat planners with an automated capability to pull together the information on resources, weaponeering options, and the current battle situation that will reduce time to generate the Air Tasking Order (ATO) by a factor of ten. A force level execution decision aid (FLEX) will provide automated support for the dynamic air combat retasking process. The combination of these capabilities will provide the foundation for an automated Air Operations Center (AOC, formerly TACC). This project also performs rapid prototyping to address the requirements and technology for theater missile defense using existing and planned capabilities.

(U) FY 1993 Accomplishments:
- (U) - Completed Advanced Planning System (APS) Phase V production and fielding to the Combat Air Forces (CAF) ($2.6M).
- (U) - Continued verification and validation of the APS software and documentation to support APS as a fieldable system ($0.6M)
- (U) - Supported CTAPS integration efforts ($0.5M).
- (U) - Support Theater Missile Defense (TMD) prototyping ($1.9M).

(U) FY 1994 Plans:
- (U) - Complete verification and validation of APS software ($0.3M).
- (U) - Initiate development of Force Level Execution (FLEX) automation for the Combat Operations Division of the Air Operations Center (AOC) ($2.4M).

Program Element: 0603617F **Date:** February 1994
PE Title: Command, Control, & Communications (C3) Applications
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity : #5 - Communications Development and Intelligence

(U) - Continue theater missile defense prototyping ($2.0M).
(U) - Initiate Theater Battle Management (TBM) system integration evaluations ($0.3M).

(U) FY 1995 Plans:
(U) - Continue FLEX development ($2.4M).
(U) - Transition theater missile defense prototyping. (not separately priced).
(U) - continue TBM system integration evaluations ($0.4M).
(U) - Initiate planning for Operations-Intelligence integration development ($0.2M).

(U) Work Performed By: See Project 2314.

(U) Related Activities: See Project 2314.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: APS has been approved for release to Saudi Arabia as a component in the Peace Shield Foreign Military Sales Program. Release to other countries is under evaluation.

4. (U) Project 3804, Tactical Air Forces Systems Integration: Project provides systems engineering to address system level issues associated with integration of Command, Control, Communications, and Intelligence (C3I) elements with command and control enhancements to Theater Battle Management (TBM) systems.

(U) FY 1993 Accomplishments:
(U) - Supported analysis and planning of TBM core system theater integration ($0.2M).
(U) - Initiated operational analysis of air campaign planning operations/intelligence interface in preparation for development planning. ($0.1M)
(U) - Initiated TBM force level prototype system evaluation environment ($0.1M).

(U) FY 1994 Plans:
(U) - Continue support of analysis of TBM core system theater integration ($0.1M).

Program Element: 0603617F **Date:** February 1994
PE Title: Command, Control, & Communications (C3) Applications
Budget Activity : #4 - Demonstration and Validation
Old Budget Activity : #5 - Communications Development and Intelligence

(U) - Expand analysis of operations/intelligence interface to include issues of joint operations. ($0.1M).

(U) FY 1995 Plans:
(U) - Continue support of TBM core system integration ($0.1M).
(U) - Complete operations/intelligence interface analysis and expand to defensive planning functions ($0.1M).
(U) - Expand TBM force level system prototype evaluations to joint arena ($0.1M).

(U) Work Performed By: See Project 2314.

(U) Related Activities: See Project 2314.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603707F
PE Title: Weather Systems Advanced Development
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2688 Weather Support Technology	2,786	2,687	2,935	3,242	3,391	3,367	3,483	Cont	TBD
2781 Weather Radar Technology	400	400	400	400	400	400	400	Cont	TBD
4026 Centralized Weather Support Technology	1,816	1,340	1,765	2,070	2,105	2,037	2,035	Cont	TBD
Total	5,002	4,427	5,100	5,712	5,896	5,804	5,918	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program demonstrates and transitions new technologies for weather support forces and their operational customers worldwide. Technologies include new data management and forecasting techniques to improve the accuracy and efficiency of weather support to battlefield commanders and peacetime training operations. The program also provides new technologies to improve centralized space/weather support capabilities at the Air Force's Global Weather Central and Space Forecast Center.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2688, Weather Support Technology: This project improves the Air Force's ability to gather, integrate, and forecast target weather information in data-denied battle areas. This is accomplished through the demonstration of tactical automated weather observations sensors, techniques to fuse weather data from different sources and times into a single "best available" analysis, and weather forecast models to address various levels of in-theater data availability.

(U) FY 1993 Accomplishments:
- (U) Incorporated high value targets and other enhancements into a weather impact decision aid for electro-optical (EO) weapon systems. ($800K)
- (U) Completed development of tactical weather observations sensors. ($300K)
- (U) Incorporated geographic information and thermal target scene refinements into an advanced target detection and EO weather impact decision aid. ($450K)
- (U) Continued development of Combat Weather System analysis and forecast models. ($580K)
- (U) Continued development of a Night Vision Goggle Air Refueling Decision Aid (ARDA). ($431K)
- (U) Continued development of new Base Weather Station technologies. ($225K)

Program Element: #0603707F
PE Title: Weather Systems Advanced Development
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop target scenes for the advanced electro-optical (EO) weather impact decision aid. ($700K)
- (U) Demonstrate battlefield utility of the tactical weather observation sensors. ($280K)
- (U) Develop a first-in, limited data battlefield weather forecast model. ($200K)
- (U) Continue development of Combat Weather System (CWS) analysis and forecast models. ($550K)
- (U) Continue development of Night Vision Goggle (NVG) Air Refueling Decision Aid (ARDA). ($807K)
- (U) Continue development of new Base Weather Station (BWS) technologies. ($150K)

(U) FY 1995 Planned Program:
- (U) Develop new capability for integrating all available in-theater weather observations into automated weather analyses. ($200K)
- (U) Complete/deliver weather impact decision aid for NVGs. ($180K)
- (U) Complete/deliver the first-in battlefield weather forecast model. ($200K)
- (U) Demonstrate weather impact decision aids on mission planning systems. ($800K)
- (U) Continue development of CWS analysis and forecast models. ($700K)
- (U) Develop NVG Operations Weather Software (NOWS) decision aids. ($235K)
- (U) Evaluate new CWS weather observation sensors. ($350K)
- (U) Continue development of new BWS technologies. ($270K)

(U) Work Performed By: This project is managed by Phillips Laboratory, Hanscom AFB, MA. High value target modeling is being done by Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are: Science and Technology Corp., Hampton, VA; Battelle Labs, Columbus, OH; Hughes STX Corp., Lanham, MD; Transportation Systems Center, Cambridge, MA; and Georgia Institute of Technology, Atlanta, GA.

(U) Related Activities:
- (U) PE 035160F, Defense Meteorological Satellite Program.
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0305111F, Weather Service.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2781, Weather Radar Technology: This project develops new technologies to fully exploit the capabilities of new operational DOD doppler weather radars. These technologies will be used by the Air Force to better observe and forecast severe weather, such as wind shear, tornadoes, and hail.

Program Element: #0603707F
PE Title: Weather Systems Advanced Development
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed a new technique to locate the center of hurricanes. ($125K)
- (U) Completed a new technique to detect freezing rain. ($100K)
- (U) Continued development of new severe weather identification techniques. ($175K)

(U) FY 1994 Planned Program:
- (U) Complete a technique to locate weather fronts. ($125K)
- (U) Develop technique to correlate severe weather and observed wind fields. ($150K)
- (U) Continue development of new severe weather identification techniques. ($125K)

(U) FY 1995 Planned Program:
- (U) Develop/evaluate a new algorithm for tornado and hail detection. ($150K)
- (U) Evaluate relationship between precipitation structures and severe weather. ($125K)
- (U) Evaluate new severe weather quantification algorithm. ($125K)

(U) Work Performed By: This project is managed by Phillips Laboratory, Hanscom AFB, MA. The only contractor is Hughes STX Corp., Lanham, MD.

(U) Related Activities:
- (U) PE 035160F; Defense Meteorological Satellite Program.
- (U) PE 0602601F, Phillips Laboratory.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 4026, Centralized Weather Support Technology: This project develops technologies for space forecasting models for the earth's neutral atmosphere, ionosphere, and magnetosphere needed to provide critical support to Air Force surveillance, communications, and other satellite assets. This project also develops new global and theater weather forecast techniques to improve the Air Force's capability to provide centralized weather support to fixed-site and deployed weather forces worldwide.

(U) FY 1993 Accomplishments:
- (U) Completed a tropical storm algorithm using satellite imagery. ($150K)
- (U) Completed initial version of space specification and forecast models to improve predictions of hazardous space environments for space vehicles. ($350K)
- (U) Delivered an ionospheric scintillation model to improve predictions of satellite communications outages. ($200K)

Program Element: #0603707F
PE Title: Weather Systems Advanced Development
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

- (U) Continued development of a neutral atmosphere/space specification and forecast model for the Air Force's Space Forecast Center (AFSFC). ($666K)
- (U) Continued development of an enhanced global cloud prediction model. ($450K)

(U) FY 1994 Planned Program:
- (U) Complete an enhanced global cloud prediction model. ($150K)
- (U) Deliver a neutral atmosphere model used for satellite orbital predictions. ($150K)
- (U) Complete a magnetospheric model for predicting satellite anomalies. ($150K)
- (U) Develop a model for predicting space upsets of microelectronics devices. ($150K)
- (U) Continue development of a neutral atmosphere/space specification and forecast model for the AFSFC. ($590K)
- (U) Begin development of a global aviation weather hazard prediction model. ($150K)

(U) FY 1995 Planned Program:
- (U) Deliver a validated ionospheric model for understanding and forecasting communication systems outages. ($300K)
- (U) Deliver a global ionospheric forecast model for spacetrack and communication predictions. ($200K)
- (U) Develop a model for coupling the ionosphere and neutral atmosphere. ($325K)
- (U) Continue development of a neutral atmosphere/space specification and forecast model for the AFSFC. ($625K)
- (U) Continue development of a global aviation weather hazard prediction model. ($315K)

(U) Work Performed By: This project is managed by Phillips Laboratory, Hanscom AFB, MA. The two contractors are: Assurance Technology Corp., Carlisle, MA; and Amptek Inc., Bedford, MA.

(U) Related Activities:
- (U) PE 035160F, Defense Meteorological Satellite Program.
- (U) PE 0602601F, Phillips Laboratory.
- (U) PE 0305111F, Weather Service.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603714F
Date: February 1994
PE Title: DOD Physical Security Equipment - Exterior
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
0003 Improved Miniature Intrusion Detection System (IMIDS)								
525	495	0	0	0	0	0	0	1,750
0005 Active Denial								
0	0	0	0	0	0	0	0	0
Total								
525	495	0	0	0	0	0	0	1,750

Note: The Air Force normally receives RDT&E funds from OSD PE 0603228D for these types of projects. However, these two projects are being funded through PE 0603714F to satisfy Air Force unique requirements. The remaining Air Force physical security requirements will continue to be funded by PE 0603228D.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Program Element supports the development of the Department of Defense Base and Installation Security System, a standardized set of components, interfaces, and methods for creating exterior physical security systems. It provides for development of system components in three functional areas: detection, command and control, and imaging. Developing systems in these areas will help satisfy the Department of Defense's need for a family of standardized, modular equipment which can be integrated into multiple system configurations. Each configuration will provide a level of security consistent with the deployment mode, threat level, and sensitivity of the asset being protected. The resulting equipment enhances the ability of security

Program Element: #0603714F
PE Title: DOD Physical Security Equipment - Exterior
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

forces to detect and intercept terrorists and improves the utilization of existing manpower by increasing mobility. This element is an Engineering and Manufacturing Development (EMD) activity because the projects herein are currently involved in the development, integration, and testing of security systems in preparation for production.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 0003, Improved Miniature Intrusion Detection System: This project provides engineering development and integration efforts for a sensor system that will detect an intruder(s) in covert and relocatable environments while emphasizing mobility and minimum manpower requirements for protecting non-nuclear assets. The primary focus is on developing low cost, expendable sensor systems with increased data communications capabilities that provide multiple verification of intrusions at non-nuclear weapons storage locations. Additionally, the program will provide a capability to record and store multiple sensor alarms, enabling a prioritized response to multiple alarm situations. This program allows Security Police to increase their coverage areas with no increase in existing manpower.

(U) FY 1993 Accomplishments:
(U) - Completed study to investigate/evaluate various combinations of commercial and developed equipment for use as a sensor data communications system. (Not separately priced (NSP)) (Mar 93)
(U) - Initiated brassboard prototype design activities. ($.53M) (Sep 93)
(U) - Initiated development of software to relay sensor status information to handheld monitor. (NSP) (Sep 93)

(U) FY 1994 Plans:
(U) - Complete brassboard prototype design activities. (NSP) (Mar 94)
(U) - Complete development of software to relay sensor status information to handheld monitor. (NSP) (Mar 94)
(U) - Complete pre-production surface-mount articles. ($.30M) (Jul 94)
(U) - Complete Development Test and Evaluation. ($.10M) (Aug 94)
(U) - Complete Technical Data Package. ($.095M) (Sep 94)

(U) FY 1995 Plans: Not Applicable.

Program Element: #0603714F
PE Title: DOD Physical Security Equipment - Exterior
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

(U) Program to Completion: Not Applicable.

(U) Work Performed By: This project is managed by the Electronic Security and Communication Systems Directorate, Electronic Systems Center, Hanscom AFB MA. Engineering assistance for this project will be provided by Mei Technology Corp, Lexington MA, and Analytical Systems Engineering Corp, Burlington, MA.

(U) Related Activities:
(U) - Program Element 0603228D, DOD Physical Security Equipment.
(U) - Program Element 0207588F, Air Base Ground Defense.
(U) - Program Element 0207589F, Base Physical Security System.
(U) - The Physical Security Equipment Action Group (PSEAG) coordinates the activities of the Services and Defense Nuclear Agency on development and acquisition of electronic security equipment.
(U) - Joint Potential Designator is not applicable.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, Other Procurement, Budget Activity 03, Program Title Air Force Physical Security System								
30,676	29,083	25,552	25,428	24,778	28,080	29,073	Cont	TBD

Quantities: Multiple items, various quantities (BPAC includes funds for IMIDS components as well as SCOPE SHIELD radios and tactical communications equipment, several annunciators, InfraRed sensors, Closed Circuit TV cameras, microwave fence sensors, buried line sensors, seismic sensors, various displays, and other electronic security equipment).

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603714F
PE Title: DOD Physical Security Equipment - Exterior
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

2. (U) Project 0005, Active Denial: This project provides for the development of a system that will automatically detect and deny an intruder(s) access to nuclear weapons in storage. It will improve security of nuclear weapons while reducing cost and reliance on manpower to deny access. Current techniques and equipment are manpower intensive. They provide Security Police forces with a capability to detect an intruder with only a limited option of intervention with personnel. This new system will automatically detect an intruder and then deny access to nuclear weapons storage areas by applying incremental penalties. These penalties will increase in severity as the intruder(s) gets closer to the weapons storage area. The system is expected to significantly reduce Security Police manpower requirements by integrating directed energy devices with complementary delay equipment (detection, surveillance, and command and control components). When fielded the system will minimize reliance on barriers, various sensors, and conventional firearms to repel intruders. This project is an FY94 new start. It is a delta package intended to accelerate development efforts on complementary systems to provide an automated denial capability for Security Police forces. It is the Air Force's number one physical security project and has been endorsed by the DoD Physical Security Equipment Action Group (PSEAG).

(U) FY 1993 Accomplishments: Not Applicable.

(U) FY 1994 Plans:
(U) - ACC will conduct a cost effectiveness analysis of active denial technologies to produce a basis for a decision on a preferred approach. (Sep 94)

(U) FY 1995 Plans: Not Applicable. (Air Force terminated project because of non-related affordability concerns).

(U) Program to Completion: Not Applicable.

(U) Work Performed By: This project is managed by the Electronic Security and Communication Systems Directorate, Electronic Systems Center, Hanscom AFB, MA. Laboratory support for the project is provided by the Directed Energy Division, Armstrong Laboratory, Brooks AFB, TX, and Phillips Laboratory, Kirtland AFB, NM.

Program Element: #0603714F **Date:** February 1994
PE Title: DOD Physical Security Equipment - Exterior
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

(U) Related Activities:
(U) - Program Element 0603228D, DOD Physical Security Equipment.
(U) - Program Element 0207588F, Air Base Ground Defense.
(U) - Program Element 0207589F, Base Physical Security System.
(U) - The Physical Security Equipment Action Group (PSEAG) coordinates the activities of the Services and Defense Nuclear Agency on development and acquisition of electronic security equipment.
(U) - Joint Potential Designator is not applicable.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603723F
PE Title: Civil and Environmental Engineering Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2103 Environmental Quality Advanced Technology	3,193	8,039	5,448	5,693	6,583	6,857	6,676	Cont	TBD
2104 Air Base Operability Advanced Technology	5,799	4,028	3,050	3,231	3,794	3,465	3,073	Cont	TBD
3037 Noise and Sonic Boom Impact Technology	2,195	1,293	1,300	1,366	1,395	1,321	1,310	Cont	TBD
Total	11,187	13,360	9,798	10,290	11,772	11,643	11,059	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops and demonstrates advanced technologies to: (1) solve Air Force-unique environmental problems to comply with all laws while maintaining readiness, conducting realistic training, and deploying new weapons; (2) enhance air base survival and recovery from chemical/biological or conventional attack; (3) apply cost-effective technology advances to air base operations; and (4) develop models and methodologies to predict aircraft noise and sonic boom stimuli and describe its effects on humans, animals, and structures. The Environmental Quality Technology goals are: 50% reduction in generation of selected hazardous waste ($13M savings annually in operations and maintenance costs); cost-effective control technology for industrial emissions from aircraft painting operations ($6M savings annually); and 95% faster downwind hazard corridor prediction for disaster response. The Civil Engineering technology development goals are: wartime survivability of critical air base facilities and utilities; air base damage assessment in minutes versus hours; rapid repair of air base facilities, utilities, and operating surfaces; and 100% improvement in post-attack fire suppression and crash rescue. The Noise and Sonic Boom Impact Technology goal is rapid environmental impact assessment and mitigation for Air Force flying operations.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2103, Environmental Quality Advanced Technology: This project develops and demonstrates advanced technologies to solve environmental restoration problems, reduce hazardous emissions from weapon systems, minimize Air Force industrial waste, and eliminate toxic pollutant releases from Air Force operations.

Program Element: #0603723F
PE Title: Civil and Environmental Engineering Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Developed model of gaseous dispersion of rocket fuel for predicting hazardous conditions associated with accidental release during space launch operations to permit rapid assessment of danger zones and hazard corridors and improved planning for emergency response. ($150K)
- (U) Developed bioreactor technology for degrading organic compounds in groundwater to improve Air Force capability to remediate contamination on site. ($220K)
- (U) Demonstrated bioventing technology for in situ remediation of fuel-contaminated soils to enhance Air Force technology options for treating one of the most common problems on Air Force facilities. ($250K)
- (U) Developed hazardous waste minimization technologies for reducing the production at Air Force facilites of metal-bearing wastes, solvents, plating/coating processes, and weapon materials to help reduce the potential environmental burden to soil and groundwater for future Air Force operations. ($1,116K)
- (U) Developed technologies to control emissions of air toxics, volatile organic compounds (VOCs), and oxides of nitrogen (NOx) to reduce environmental burden to atmosphere from future Air Force operations. ($515K)
- (U) Developed technologies to characterize, monitor, and remediate contaminated Air Force sites to reduce Air Force costs of returning sites to clean conditions. ($942K)

(U) FY 1994 Planned Program:
- (U) Develop technology to reduce contaminants from Air Force processes by finding new methods of plating and coating materials, removing contaminants from processing baths, and treating for contamination by heavy metals. ($5,317K)
- (U) Demonstrate technology to destroy energetic material wastes such as solid rocket propellant in an environmentally-safe process to permit destruction of solid rockets without open burning. ($1,360K)
- (U) Develop technologies to control atmospheric emissions of air toxics, VOCs, and NOx to permit Air Force compliance with the Clean Air Act. ($201K)
- (U) Demonstrate technologies to clean contaminated groundwater for faster and more efficient cleanup of fuel and chemical spills. ($1,161K)

(U) FY 1995 Planned Program:
- (U) Develop technology to reduce contaminants from Air Force processes by finding new methods of plating and coating materials, removing contaminants from processing baths, and treating for contamination by heavy metals. ($1,958K)
- (U) Demonstrate technology to destroy energetic material wastes such as solid rocket propellant in an environmentally-safe process to permit destruction of solid rockets without open burning. ($400K)
- (U) Develop technologies to control atmospheric emissions of air toxics, VOCs, and NOx to permit Air Force compliance with the Clean Air Act. ($1,165K)
- (U) Demonstrate technologies to clean contaminated groundwater for faster and more efficient cleanup of fuel and chemical spills. ($775K)

Program Element: #0603723F
PE Title: Civil and Environmental Engineering Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

- (U) Developed technologies to characterize, monitor, and remediate contaminated Air Force sites to reduces Air Force costs of returning sites to clean conditions. ($400K)
- (U) Begin demonstrating biodegradation technology for use on nitroaromatics contamination. ($750K)

(U) Work Performed By: This project is managed by Armstrong Laboratory, Tyndall AFB, FL. The major contractors are: EG&G, Idaho Falls, ID; ACUREX, Mountain View, CA; Martin Marietta, Denver, CO; ASI, Albuquerque, NM; and MSE Inc., Butte, MT.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602203F, Aerospace Propulsion.
- (U) PE 0602206F, Civil Engineering and Environmental Quality.
- (U) PE 0603211F, Aerospace Structures.
- (U) PE 0603716D, Strategic Environmental Research and Development Program.
- (U) PE 0604708F, Other Operational Equipment.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2104, Air Base Operability Advanced Technology: This project develops and demonstrates advanced technologies to build air base facilities and utilities that can survive chemical, biological, and conventional weapons attack. It also develops advanced technologies to: construct and repair runways and air mobile structures; perform damage assessment and repair; perform crash rescue and suppression of aircraft and air base post-attack fires; and perform critical peacetime civil engineering construction, maintenance, and repair.

(U) FY 1993 Accomplishments:
- (U) Demonstrated technologies and design criteria for improved bare-base/fixed-site applications (e.g., power and environmental utilities, survivable air base structures, and durable/repairable airfield surfaces). ($3,883K)
- (U) Demonstrated advanced aircraft/air base fire fighting technologies (e.g., clean, environmentally-safe fire fighting agents, vehicles, equipment, personnel protective clothing, fire risk assessment techniques, and fire fighter training systems). ($1,916K)

(U) FY 1994 Planned Program:
- (U) Demonstrate technologies and design criteria for improved bare-base/fixed-site applications (e.g., power and environmental utilities, survivable air base structures, and durable/repairable airfield surfaces). ($2,853K)

Program Element: #0603723F
PE Title: Civil and Environmental Engineering Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) Demonstrate advanced aircraft/air base fire fighting technologies (e.g., clean, environmentally-safe fire fighting agents, vehicles, equipment, personnel protective clothing, fire risk assessment techniques, and fire fighter training systems). ($1,175K)

(U) FY 1995 Planned Program:
- (U) Demonstrate technologies and design criteria for improved bare-base/fixed-site applications (e.g., power and environmental utilities, survivable air base structures, and durable/repairable airfield surfaces). ($2,309K)
- (U) Demonstrate advanced aircraft/air base fire fighting technologies (e.g., clean, environmentally-safe fire fighting agents, vehicles, equipment, personnel protective clothing, fire risk assessment techniques, and fire fighter training systems). ($741K)

(U) Work Performed By: This project is managed by Wright Laboratory, Tyndall AFB, FL. The major contractors are: Applied Research Associates, Albuquerque, NM; New Mexico Engineering Research Institute, Albuquerque, NM; EML Research, Hudson, NH; Research Associates of Syracuse, Syracuse, NY; and Harris Group, Reston, VA.

(U) Related Activities:
- (U) PE 0602102F, Materials.
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602206F, Civil Engineering and Environmental Quality.
- (U) PE 0603231F, Crew Systems and Personnel Protection Technology.
- (U) PE 0603307F, Air Base Operability Advanced Development.
- (U) PE 0604617F, Air Base Operability.
- (U) PE 0604703F, Aeromedical/Chemical Defense Systems Development.
- (U) PE 0604708F, Other Operational Equipment.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3037, Noise and Sonic Boom Impact Technology: This project develops and demonstrates technologies to predict and evaluate the environmental impacts of noise from aircraft operations, as directed by the National Environmental Policy Act. It addresses the effects of aircraft noise on humans, animals, and structures, and also develops technologies for active noise control. Improving this capability is essential for timely response to public concerns, preparation of accurate environmental impact statements, and minimizing unfavorable legal challenges to these documents.

Program Element: #0603723F
PE Title: Civil and Environmental Engineering Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed the field test for aircraft noise assessment technology. ($690K)
- (U) Completed the test of the effects of aircraft noise on caribou and bighorn sheep. ($370K)
- (U) Completed the test of cumulative damage to plaster using simulated sonic booms. ($375K)
- (U) Continued development of technology for a monitor of human response to noise. ($410K)
- (U) Continued study to assess the impact of aircraft noise on predator/prey interactions. ($350K)

(U) FY 1994 Planned Program:
- (U) Complete documentation and make available for transition Phase I of the aircraft noise assessment technology. ($300K)
- (U) Develop advanced technologies to support assessment of effects of aircraft noise on animals and man -- permits improved prediction of acceptable military training routes and improved defense of the use of Air Force training ranges. ($693K)
- (U) Demonstrate advanced active noise cancellation (ANC) headsets technology and report on effectiveness of using active noise control in engine maintenance facilities. ($300K)

(U) FY 1995 Planned Program:
- (U) Complete documentation and make available for transition Phase II of the aircraft noise assessment technology. ($340K)
- (U) Complete and publish report on effects of cumulative noise damage to building structures and glass. ($210K)
- (U) Develop advanced technologies to support assessment of effects of aircraft noise on animals and man -- permits improved prediction of acceptable military training routes and improved defense of the use of Air Force training ranges. ($750K)

(U) Work Performed By: This project managed by Armstrong Laboratory, Wright-Patterson AFB, OH. The major contractor is BB&N, Canoga Park, CA.

(U) Related Activities:
- (U) PE 0602202F, Human Systems Technology.
- (U) PE 0602203F, Aerospace Propulsion.
- (U) PE 0602206F, Civil Engineering and Environmental Quality.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603726F
PE Title: Command, Control, and Communications (C3) Subsystems Integration
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2810 Advanced Image/Information Applications	2,390	2,400	3,295	6,030	7,630	6,518	6,325	Cont	TBD
2863 Integrated Photonics	4,385	4,064	4,255	4,950	5,000	4,231	4,105	Cont	TBD
3192 Strategic/Tactical Optical Disk Systems (S/TODS)	2,588	2,153	3,500	4,588	5,901	7,270	7,052	Cont	TBD
Total	9,363	8,617	11,050	15,568	18,531	18,019	17,482	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops and demonstrates C3 technologies in the areas of spatial data manipulation of digital databases, photonics technology, optical disk storage/processing of digital information, and distributed processing technology for interoperability between dispersed command centers. These technologies provide increased storage, processing, and transmission of digital data that contains unlimited data content.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2810, Advanced Image/Information Applications: This project develops and demonstrates techniques and software to meet weapon systems requirements for digital image and spatial data required for mission planning, navigation, targeting, and terrain analysis. This project provides generic interrogation techniques, as well as standard applications software for Air Force exploitation of digitally processed image and spatial data products. Additionally, it develops an automated capability to reference and display hypermedia communications.

   (U) FY 1993 Accomplishments:
   - (U) Demonstrated Defense Analysis Warning System (DAWS) integrated with the Common Mapping System (CMS) and the upgraded CMS database and applications interface for operational command network surveillance; transitioned CMS standardized data and applications server capabilities to the unit-level Sentinel Byte Testbed and demonstrated software to consolidate multiple applications while optimizing speed, accuracy, and reliability. ($1,890K)

Program Element: #0603726F
PE Title: Command, Control, and Communications (C3) Subsystems Integration
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

- (U) Conducted initial Machine-Aided Voice Translation (MAVT) demonstration to develop an advanced voice translation system. ($400K)
- (U) Conducted initial study phase of hypermedia integration to develop an efficient multimedia access and display system. ($100K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate advanced imagery and information technologies to enhance warfighter mission planning, navigation, targeting, and terrain analysis; deliver the Air Force Geographic Information Handling System to the user community. ($1,500K)
- (U) Develop and demonstrate automated capabilities to display hypermedia communications which fully exploit the data available to the field commander in a timely manner; develop hypermedia core software, interface, and brassboard applications. ($500K)
- (U) Develop and demonstrate advanced interrogative techniques which fully exploit the available information to the warfighter; design automated voice translation system for multi-language military interrogation and informant screening. ($400K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate advanced imagery and information technologies to enhance warfighter mission planning, navigation, targeting, and terrain analysis; design a transportable intelligence correlator and automated intelligence message update, filter, and retrieval processes; develop an all-source fusion capability to locate, identify, and track mobile red, green, and blue military components. ($2,150K)
- (U) Develop and demonstrate automated capabilities to display hypermedia communications which fully exploit the data available to the field commander in a timely manner; complete hypermedia brassboard and demonstrate at operational exercises. ($925K)
- (U) Develop and demonstrate advanced interrogative techniques which fully exploit the available information to the warfighter; expand languages available on the automated voice translation system. ($220K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: Grumman Data System, Woodbury, NY; Sterling Software Inc., Bellevue, NE; Synetics Corp., Rome, NY; Language Systems Inc., Tarzana, CA; and Georgia Institute of Technology Research Institute, Atlanta, GA.

(U) Related Activities:
- (U) PE 0603238F, Global Surveillance and Communications.
- (U) PE 0602702F, C3.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) PE 0603728F, Advanced Computer Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0603726F
PE Title: Command, Control, and Communications (C3) Subsystems Integration
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

2. (U) Project 2863, Integrated Photonics: Current electronic systems are susceptible to electromagnetic interference, electromagnetic pulse, and radio frequency (RF) interference. Size constraints, speed, and reliability also limit traditional electronic systems. Photonics-based systems, that process information in the form of light (photonics) signals, will provide major improvements in tactical and strategic C3 systems by providing small size, high performance, high capacity, survivable alternatives to electronic-based systems. This program demonstrates advanced hardware technology in optical processing, adaptive transmission, and nonlinear optical processing.

(U) FY 1993 Accomplishments:
- (U) Demonstrated a distortion free analog photonic remote linking for High Frequency/Very High Frequency/Ultra High Frequency signals; developed an optical frequency synthesizer. ($2,285K)
- (U) Conducted initial development study of an integrated optic control system for surveillance and communications phased array antennas; designed a one trillion operations per second optical processor for automatic combat identification (ID) of ground and airborne targets. ($2,100K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate analog and digital optical processing technologies to provide the warfighter real-time data for pre- and post-mission analysis, as well as jam resistant sources for tactical and C3 systems. ($1,200K)
- (U) Develop and demonstrate microwave/millimeter wave photonics processing, and photonics subsystems essential for advanced optically controlled RF systems; design an optically controlled phased array for Super High Frequency (SHF) operations.($2,864K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate analog and digital optical processing technologies to provide the warfighter real-time data for pre- and post-mission analysis, as well as sensor integration and automatic target ID using multispectral surveillance systems. ($755K)
- (U) Develop and demonstrate microwave/millimeter wave photonics processing and photonic subsystems essential for advanced optically controlled RF systems at increased frequencies; develop an optically phased array for SHF operations. ($3,500K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are Hughes GM, Los Angeles, CA; Westinghouse, Baltimore, MD; United Technologies Photonics, Bloomfield, CT; and TRW, El Segundo, CA.

(U) Related Activities:
- (U) PE 0603238F, Global Surveillance and Communications.
- (U) PE 0602702F, C3.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) PE 0603728F, Advanced Computer Technology.

Program Element: #0603726F
PE Title: Command, Control, and Communications (C3) Subsystems Integration
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3192, Strategic/Tactical Optical Disk Systems (S/TODS): Present C3 systems lack low-cost, high density data storage capacity and performance required for advanced operations and near-real-time sensor inputs. This project develops S/TODS, a family of erasable data optical storage systems with the high capacity/speed input/output needed. S/TODS includes a single 5.25-inch optical disk recorder/player, a single 14-inch optical disk recorder/player, and a ten-disk automated Optical Jukebox. The 5.25-inch S/TODS is for fighter aircraft for airborne access to mission-oriented data and the digital terrain system. The 14-inch S/TODS is for on-board sensor data storage in electronic surveillance aircraft and will be used to develop a deployable optical Jukebox for Air Force Special Operations Command's mission planning requirements. For large storage requirements, the Optical Jukebox will be expanded for Air Combat Command's (ACC) Contingency Airborne Reconnaissance System (CARS). In addition, the Optical Jukebox can be applied to ACC's requirements for high-volume digital imagery exploitation. An array of optical disk drives will be developed for high throughput speed and fault-tolerant requirements.

(U) FY 1993 Accomplishments:
- (U) Completed the integration and flight demonstration of the 14-inch S/TODS for airborne electronic data recording; conducted preliminary design study of the ten-disk Optical Jukebox for users. ($2,588K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate optical information data handling, storage, and access technologies needed for strategic and tactical applications; design an array of optical disk drives for high-speed, fault-tolerant computer network applications. ($453K)
- (U) Design, develop, and demonstrate optical disk and interface technologies which can be implemented in joint theater operations; design a high capacity Optical Jukebox system. ($1,700K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate optical information data handling, storage, and access technologies needed for strategic and tactical applications; demonstrate operation of the optical disk array; design an optical three-dimensional memory. ($2,250K)
- (U) Design, develop, and demonstrate optical disk and interface technologies which can be implemented in joint theater operations; fabricate and test the high capacity Optical Jukebox. ($1,250K)

Program Element: #0603726F
PE Title: Command, Control, and Communications (C3) Subsysems Integration
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: General Electric, Camden, NJ; and Kodak, Rochester, NY.

(U) Related Activities:
- (U) PE 0603238F, Global Surveillance and Communications.
- (U) PE 0602702F, C3.
- (U) PE 0603789F, C3 Advanced Technology Development.
- (U) PE 0603728F, Advanced Computer Technology.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603728F
PE Title: Advanced Computer Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

A. (U) RESOURCES ($ In Thousands):

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2527 Software Life Cycle Tools	4,048	2,624	3,325	4,060	5,127	5,004	5,061	Cont	TBD
2530 Distributed Systems Reliability and Survivability	7,858*	1,738	2,000	5,000	6,000	5,700	5,400	Cont	TBD
2532 Knowledge-Based Systems	4,148	3,712	3,800	6,000	7,000	6,800	6,600	Cont	TBD
Total	16,054	8,074	9,125	15,060	18,127	17,504	17,061	Cont	TBD

*In FY 1993, Congress added $6M to upgrade a high-speed hypercube computer for speech modulation research.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program develops and demonstrates technologies needed to control cost, reduce risk, and increase efficiency and effectiveness of software and computers required for mission critical combat systems. DOD has experienced a dramatic escalation in the cost of acquiring and maintaining embedded computer software for increasingly complex military systems which must be reliable and survivable in the battlefield environment. The requirement for survivable tactical, strategic, and space computing systems has driven the need for automatic integration and interoperability of multiple processing elements, automatic redistribution of data and functions, and location-independent access of data. Distributive processing techniques, which can dynamically reconfigure assets to accommodate lost components or nodes, are required to ensure survivable mission critical command and control functions.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2527, Software Life Cycle Tools: Advanced computer systems in Air Force weapon systems require software life cycle tools and software engineering technology to improve quality and productivity. This project develops, evaluates, and transitions new software engineering technology that reduces cost, while improving software, systems, and productivity factors. It develops software life cycle support environments which incorporate both off-the-shelf and laboratory products. These environments provide

Program Element: #0603728F
PE Title: Advanced Computer Technology
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

a vehicle for software technology integration, transition, and evaluation under operational and field conditions. Technologies for system requirements analysis, reuse of software components, software quality specification, measurement, assessment, and high advanced computer software engineering are also produced.

(U) FY 1993 Accomplishments:
- (U) Developed advanced technology components for the Enhanced Software Life Cycle Support Environment (E-SLCSE) and completed Build I of Process Software Life Cycle Support Environment (ProSLCSE) architecture which provides a process definition capability and a user interface. ($1,688K)
- (U) Developed rapid prototyping capabilities, graphical requirements language, and requirements engineering technology for the Requirement Engineering Environment (REE). ($888K)
- (U) Completed parallel software benchmarks for Command, Control, and Communications battle management systems. ($623K)
- (U) Developed software and system quality enhancements through automated tools and methods, including an initial set of software quality metrics and database design for benchmarks and baselines. ($849K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate system software support environments which address the system life cycle for parallel and concurrent systems while emphasizing affordability and software reuse certification technologies. ($816K)
- (U) Develop and demonstrate system definition technologies to provide the user the means to address total system requirements engineering for large-scale systems. ($1,045K)
- (U) Develop and demonstrate software and system quality enhancements through automated tools and methods. ($513K)
- (U) Develop high performance computer software and architecture for weapon system applications. ($250K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate system software support environments which address the system life cycle for parallel and concurrent systems while emphasizing affordability and software reuse certification technologies. ($835K)
- (U) Develop and demonstrate system definition technologies to provide the user the means to address total system requirements engineering for large-scale systems. ($1,655K)
- (U) Develop and demonstrate software and system quality enhancements through automated tools and methods. ($585K)
- (U) Develop high performance computer software and architecture for weapon system applications. ($250K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: Industrial Software Systems, Inc., Austin, TX; Software Productivity, Melbourne, FL; Martin Marietta, Denver, CO; Harris Corporation, Melbourne, FL; and IITRI, Lanham, MD.

Program Element: #0603728F
PE Title: Advanced Computer Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) Related Activities:
- (U) PE 0604740F, Computer Resource Management.
- (U) PE 0701112F, Inventory Control Point Operation.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2530, Distributed Systems Reliability and Survivability: This project develops technology to provide the distributed information handling for future Command, Control, Communications, and Computer (C4) systems which integrates numerous heterogeneous processing clusters and provides seamless access to any information. The system must be reconfigurable, responsive, and survivable, as well as capable of integrating the full spectrum of multimedia data. The system will operate in an "information pull" mode where the users' requests for information are filled without explicit action on the part of the user to locate, retrieve, or merge data. An object-oriented architecture will be developed to provide a common perspective which will serve as the basis for the merger between the communications control systems and the distributed computing environment.

(U) FY 1993 Accomplishments:
- (U) Developed the first phase micro kernel-based real-time distributed computing environment. ($600K)
- (U) Transitioned the CRONUS (a computer operating system) Distributed Computing Environment (DCE) to operational use as part of the Capabilities Assessment Simulation Evaluation System. ($600K)
- (U) Developed an adaptive fault manager which can dynamically respond to faults within a distributed system and reconfigure application modules, ensuring continued operation of critical functions. ($658K)
- (U) Pursued an upgrade to a high-speed hypercube computer for speech modulation research. ($6,000K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate distributed computing systems for survivability using computer cluster technologies. ($600K)
- (U) Develop and demonstrate database system techniques for managing multimedia data in distributed systems. ($400K)
- (U) Develop and demonstrate multilevel secure (MLS) computer systems technology to ensure system integrity. ($738K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate distributed computing systems for survivability using computer cluster technologies. ($800K)
- (U) Develop and demonstrate database system techniques for managing multimedia data in distributed systems. ($600K)
- (U) Develop and demonstrate MLS computer systems technology to ensure system integrity. ($600K)

Program Element: #0603728F
PE Title: Advanced Computer Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: Bolt Beranek and Newman, Cambridge, MA; SRI International, Menlo Park, CA; General Electric Corp., Valley Forge, PA; Syracuse University, Syracuse, NY; and Honeywell Corp., Minneapolis, MN.

(U) Related Activities:
- (U) PE 0604740F, Computer Resource Management.
- (U) PE 0701112F, Inventory Control Point Operation.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2532, Knowledge-Based Systems: Knowledge-based computer systems provide the capability to automatically solve reasoning problems. This effort develops computer technologies which automate the problem solving process associated with human thought. It has three major thrusts. The first, knowledge-based systems engineering, provides software tools and techniques to develop and evaluate knowledge-based systems. The second, knowledge-based planning, applies artificial intelligence (AI) technology to provide increased cost-effectiveness in diverse planning applications involving decision support to employment and deployment planning, logistics planning, and resource allocation and scheduling processes. The third, Knowledge-Based Software Assistant (KBSA), exploits knowledge-based methods to effect orders of magnitude improvement in software development and support activities.

(U) FY 1993 Accomplishments:
- (U) Demonstrated a Theater Analysis and Replanning Graphical Execution Toolkit (TARGET) for creating and refining crisis action plans at Pacific Command. ($648K)
- (U) Delivered first version of a Common Prototyping Environment (CPE) to evaluate and analyze generic AI-based planning and scheduling tools. ($1,600K)
- (U) Completed a laboratory testbed for development of large-scale AI software components, integration of AI software with conventional software components, and for measuring and comparing the performance of various AI system architectures. ($700K)
- (U) Developed algorithms design optimization component for KBSA. ($1,200K)

Program Element: #0603728F
PE Title: Advanced Computer Technology
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate knowledge-based systems engineering technologies to support robust, real-time, large-scale knowledge-based systems. ($512K)
- (U) Develop and demonstrate knowledge-based planning technologies to automate man-power-intensive tasks to allow rapid, accurate, and efficient planning. ($2,200K)
- (U) Develop and demonstrate Knowledge-Based Software Assistant (KBSA) technologies to effect a ten-fold improvement in software development and support. ($1,000K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate knowledge-based systems engineering technologies to support robust, real-time, large-scale knowledge-based systems. ($200K)
- (U) Develop and demonstrate knowledge-based planning technologies to automate man-power-intensive tasks to allow rapid, accurate, and efficient planning. ($1,800K)
- (U) Develop and demonstrate KBSA technologies to effect a ten-fold improvement in software development and support. ($1,800K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: Bolt Berranek and Newman Laboratories Inc., Cambridge, MA; GE CRD, Schenectady, NY; SRI, Menlo Park, CA; Ascent Technologies, Cambridge, MA; and GE ATL Moorestown, NY.

(U) Related Activities:
- (U) PE 0604740F, Computer Resource Management.
- (U) PE 0701112F, Inventory Control Point Operation.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603742F
PE Title: Combat Identification Technologies
Project Number: 2597
Date: February 1994
Budget Activity: #4 - Demonstration & Validation
Old Budget Activity: #4 - Tactical Programs

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Non-Cooperative Identification Subsystems								
18,169	27,948	13,453	4,594	4,447	6,597	6,800	Cont.	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The U.S. Combat Air Forces have a critical requirement to positively identify enemy, friendly, and neutral aircraft enabling the battlefield commander to effectively manage and control the air battle and minimize fratricide.

This program element develops, demonstrates, and transitions promising new target identification technologies to meet the above cited requirements. These efforts reflect the Air Force's increased emphasis and priority on positive hostile ID. Current program is in Demonstration and Validation phase for the development of Ultra-High Range Resolution (UHRR) radar non-cooperative identification technology.

Program Element: #0603742F
PE Title: Combat Identification Technologies
Project Number: 2597
Budget Activity: #4 - Demonstration & Validation
Old Budget Activity: #4 - Tactical Programs

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:

(U) -- collection slipped from 1QFY93 due to scheduling conflicts and target aircraft availability (3QFY93 - ongoing) ($8.2M).
(U) - during RED FLAG exercise (3QFY93) (Funded under HAVE CENTAUR).
(U) - Completed Theater Air Command and Control Simulation Facility (TACCSF) man-in-the-loop simulation demonstrating utility of UHRR and intra-radar fusion techniques on combat ID (2QFY93) ($0.6M).
(U) - Continued series of studies and.

(U) - utilizing FASTC synthetic UHRR radar signature generation architecture known as Design and Analysis of Reference Threat Systems (DARTS) ($1.1M).
(U) - HAVE LION) contract awarded (4QFY93) ($3.31M).
(U) - Begin analysis and fusion evaluation test bed (1QFY93) ($0.9M).
(U) - Began a formal process for documenting, managing, validating, and disseminating and UHRR radar signatures (3QFY93) ($0.8M).

2. (U) FY 1994 Planned Program:

(U) - Continue HAVE CENTAUR advanced technology demonstration and initial design verification. HAVE CENTAUR Critical Design Review (3QFY94). Large funding increment required due to bulk of Dem/Val activity ($14.875M).
(U) - Complete HAVE LION UHRR initial design to include software development and system hardware analysis only (3QFY94)($1.5M).
(U) - Provides technology support for development of UHRR to include engineering, test and evaluation, configuration control, and other program office operations ($3.925).
- Continue to fusion evaluation test bed ($.96M).
(U) - $1.8M).
(U) - Continued development of system to document, manage, validate, and disseminate and UHRR radar signatures ($0.7M).
(U) - Combat ID Advanced Technology Transition Demonstrations (ATTDs)--this effort demonstrates and validates other combat ID technologies which show promise for meeting combat air force's needs ($3.989M).

Program Element: #0603742F
PE Title: Combat Identification Technologies

Project Number: 2597
Budget Activity: #4 - Demonstration & Validation
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(U) - Conduct radar signal study. This will (3QFY94) ($0.2M).

3. (U) FY 1995 Planned Program:

(U) - Continue HAVE CENTAUR algorithm development and complete system software and hardware design/integration. Begin HAVE CENTAUR test effort (1QFY95) ($9.23M).
(U) - DARTS UHRR radar database development continues ($0.8M).
(U) - Continue tech support for UHRR development ($3.15M)
- Turn over 1QFY95) ($0.0M).
(U) - Complete fusion study ($0.273M).

4. (U) Program to Completion:

(U) - This is a continuing program.

D. (U) Work Performed By: Hughes Aircraft, Los Angeles, CA; Westinghouse, Baltimore, MD; and Veda, Dayton, OH. Management: Air Force Wright Laboratory, F-15 and F-22 System Program Offices, Wright Patterson AFB, OH; AWACS System Program Office, Hanscom AFB, MA; and Rome Laboratory, Griffiss AFB, NY.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Further demonstration of techniques is cancelled in FY 94 due to technical milestone failures. HAVE LION program deferred after FY94 with emphasis shifted to HAVE CENTAUR proof of concept.

2. (U) SCHEDULE CHANGES: Three month schedule slip in HAVE CENTAUR/HAVE LION due to contract negotiations and efforts to match funding profile. Additional HAVE LION

3. (U) COST CHANGES: Completion of several efforts with the FY95 program results in reduced levels of effort in the outyears.

Program Element: #0603742F
PE Title: Combat Identification Technologies

Project Number: 2597
Budget Activity: #4 - Demonstration & Validation
Old Budget Activity: #4 - Tactical Programs

F. (U) PROGRAM DOCUMENTATION:

- (U) TAF SORD 304-83-1/II-A (Revision 1) Advanced Tactical Fighter, 9 Nov 84, (S)
- (U) TAF SON 304-79, Air-to-Air Target Identification, 30 Jun 79, (S).
- (U) TAF SON 305-79, Surface-to-Air Target Identification, 30 Jun 79, (S).
- (U) TAF SON 304 83, Advanced Tactical fighter/Air-to-Air, 9 Nov 84, (S).
- (U) TAF SON 320-82, Advanced Tactical Surveillance System, 15 May 86, (S).
- (U) Joint Mission Need Statement (JMNS) for Combat Identification, 13 Apr 92, (S).
- (U) Multi-sensor Fusion Requirements for AWACS & Fighters, ACC/DRP ltr, 17 Feb 93, (S).

G. (U) RELATED ACTIVITIES:

- (U) PE #0603203F Advance Avionics for Aerospace Vehicles.
- (U) PE #0603789F C3I Technology Development.
- (U) PE #0602204F Aerospace Avionics.
- (U) PE #0602702F Command, Control, and Communications.
- (U) All cooperative and non-cooperative ID programs are reviewed by the General Officer Steering Committee for Combat ID (GOSC-CI).

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

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

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Program Element: #0603742F
PE Title: Combat Identification Technologies

Project Number: 2597
Budget Activity: #4 - Demonstration & Validation
Old Budget Activity: #4 - Tactical Programs

J. (U) MILESTONE SCHEDULE:

1. (U) HAVE CENTAUR:	PDR	3QFY92
	CDR	3QFY94
	Flight Test	1QFY96
	Final Report	3QFY97
2.(U) HAVE LION:	APG-68 PDR	2QFY93
	Final Report	1QFY95

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0603789F
PE Title: Command, Control, and Communications (C3) Advanced Technology Development
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2333 Surveillance Radar Technology	1,580	0	0	0	0	0	0	Cont	TBD
2335 Advanced C3 Technology	3,040	3,685	4,855	6,815	7,505	6,390	6,245	Cont	TBD
3433 Laser Communications	3,216	0	0	0	0	0	0	0	3,216
4072 Correlation and Fusing	1,387	4,988	5,070	9,365	11,635	12,143	11,869	Cont	TBD
Total	9,223	8,673	9,925	16,180	19,140	18,533	18,114	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This Advanced Development program demonstrates ground-, air-, and space-based C3 technology required to maintain Air Force capabilities in a fast-paced, sophisticated, high threat, and intense jamming environment. Enhanced surveillance and communications technology must be developed to counteract an enemy's jamming and to restore critical communications links to the warfighter. The technologies developed in this program include: detection, identification, and tracking of hostile targets at long ranges under combat conditions; reliable, secure, jam resistant communications; and battle management technology that assimilates this crucial C3 information into a form which facilitates and supports the military leader's combat decisions in response to the dynamics of the battlefield.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2333, Surveillance Radar Technology: Current Air Force tactical surveillance systems (E-3, TPS-43, and TPS-75) are limited in their ability to detect, track, and positively identify multiple targets in today's electronic warfare environment. This project develops and demonstrates advanced antenna mainbeam nulling, adaptive electronic counter-counter measure (ECCM) technologies, fusion algorithms, and conformal array technologies to restore low-observable/stealth surveillance capabilities in jammed sectors. It develops components and subsystems for surveillance systems that, when integrated, provide improved low cross-section target detection in an electronic countermeasures (ECM)/clutter environment. Project content has been transferred to Project 4072, Correlation and Fusing, beginning in FY 1994.

Program Element: #0603789F
PE Title: Command, Control, and Communications (C3) Advanced Technology Development
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Completed Conformal Array Radar Technology experimental phased array systems integration and initiated in-plant testing. ($1,580K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This project was managed by Rome Laboratory, Griffiss AFB, NY. The major contractors were: Rome Research Corp., New Hartford, NY; Raytheon, Wayland, MA; Intercon, Alexandria, VA.

(U) Related Activities:
- (U) PE 0602204F, Aerospace Avionics.
- (U) PE 0602702F, C3.
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603728F, Advanced Computer Technology.
- (U) PE 0603238F, Global Surveillance and Communications.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2335, Advanced C3 Technology: This program develops technology for Air Combat Command contingency and joint operations C3 capabilities. Fundamental to the program are the concepts of force deployment, sustainment, and employment. Dynamic, extremely hostile battlefield environments demand near instantaneous transmission and processing of vast amounts of C3 information for real-time decision making. This project develops and integrates: low probability of intercept/anti-jam (LPI/AJ) information and data processing; modular, programmable, multi-level secure communications; secure and distributed networks; advanced displays and interfaces; and battle management decision support capabilities for survivable, distributed C3 facilities. Multiband/multimode programmable radios will be enhanced to address the transmission link requirements of joint combat theater communications.

(U) FY 1993 Accomplishments:
- (U) Successfully completed critical design review of the SPEAKEASY programmable radio open system architecture and initiated fabrication for joint Service demonstration. ($1,100K)

Program Element: #0603789F
PE Title: Command, Control, and Communications (C3) Advanced Technology Development
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

- (U) Developed distributed processing technologies to provide efficient, secure, interoperable, and mobile tactical and strategic communications networks. ($840K)
- (U) Defined operations integration system design parameters for a plans function that is both integrated and interactive in air operations centers. ($100K)
- (U) Completed development of Force Level Execution (FLEX) and demonstrated it in the Theater Battle Management (TBM) C3 test environment. ($1,000K)

(U) FY 1994 Planned Program:
- (U) Develop and demonstrate critical space, ground, and air communications technology advances in programmable devices and monolithic microwave integrated circuits to provide survivable radios and transceivers; conduct initial joint-Service SPEAKEASY Phase I demonstration. ($1,835K).
- (U) Develop distributed processing technologies to provide efficient, secure, interoperable, and deployable communications networks; install Secure Survivable Communications Network (SSCN) switching nodes at Air Force, Army, Navy, and Defense Information Systems Agency sites. ($850K)
- (U) Develop and demonstrate TBM and time-critical air operations technologies to provide field commanders essential operational decision support and rapid response capabilities; conduct initial Operations-Intelligence Integration (OII) technology demonstration. ($1,000K)

(U) FY 1995 Planned Program:
- (U) Develop and demonstrate critical space, ground, and air communications technology advances in programmable devices and monolithic microwave integrated circuits to provide survivable radios and transceivers; conduct final SPEAKEASY Phase I demonstration. ($3,000K).
- (U) Demonstrate distributed processing technologies to provide efficient, secure, interoperable, and deployable communications networks; demonstrate SSCN Phase I. ($460K)
- (U) Demonstrate TBM and time-critical air operations technologies to provide field commanders essential operational decision support and rapid response capabilities; demonstrate first brassboard of OII decision support system. ($1,395K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: Rome Research Corp., New Hartford, NY; Hazeltine, Long Island, NY; Advance Decision Systems, Mountain View, CA; and GTE, Needham, MA.

(U) Related Activities:
- (U) PE 0603617F, C3 Applications.
- (U) PE 0603737D, Advanced Research Projects Agency.
- (U) PE 0603006A, C3 Technology.

Program Element: #0603789F
PE Title: Command, Control, and Communications (C3) Advanced Technology Development
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

- (U) PE 0602702F, C3.
- (U) PE 0602232N, C3 Technology.
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603728F, Advanced Computer Technology.
- (U) PE 0603238F, Global Surveillance and Communications.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3433, Laser Communications: The Air Force needs long-range, very high data rate satellite communication links. Current technology cannot meet current Air Force requirements. This project is developing flight-qualified hardware and a brassboard heterodyne laser communications (LASERCOM) system using frequency modulation which is more efficient than current pulsed-type systems. The system will ground demonstrate an inter-satellite data networking capability that can improve real-time global connectivity, reduce dependence on ground relay sites, increase coverage time for low-orbit satellites, and enhance survivability by shared redundancy. This project has been terminated.

(U) FY 1993 Accomplishments:
- (U) Tested the acquisition, tracking, and communication systems of the integrated electromagnetic optomechanical subsystem. ($1,316K)
- (U) Fabricated flight-quality fiber-coupled receiver modules. ($1,700K)
- (U) Provided design and technology baseline to future operational users. ($200K)

(U) FY 1994 Planned Program: Not Applicable.

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This project was managed by Phillips Laboratory, Kirtland AFB, NM. The major contractors were: MIT-Lincoln Lab, Hanscom AFB, MA; Optical Corp. of America, Garden Grove, CA; and Electrofusion, Fremont, CA.

(U) Related Activities:
- (U) PE 0603250F, Lincoln Laboratory.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

Program Element: #0603789F
PE Title: Command, Control, and Communications (C3) Advanced Technology Development
Budget Activity: #3, Advanced Development
Old Budget Activity: #2, Advanced Technology Development

Date: February 1994

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 4072, Correlation and Fusing: The Air Force must be able to detect, positively identify, and track hostile targets in combat to gain maximum advantage of all strategic and tactical warning sensors and beyond-visual-range (BVR) weapons to ensure maximum target engagement ranges and a first-shot, first-kill capability. Effective sensor processing improvements using advanced open architecture processors, space-time adaptive processing, tracking/fusion algorithms, bistatic sensor technology, and correlation techniques will enhance target detection and tracking ranges. Indirect Hostile Target Identification (HTI) capabilities ensure high-confidence identification (ID) to control the air battle and provide the warfighter with the necessary information to use BVR weapons. This project develops and integrates the necessary suite of complementary passive and active HTI capabilities for command and control platforms. These technologies will enhance the performance of ID and threat assessment systems for enhanced acquisition, tracking, and target engagement ranges for theater operations.

(U) FY 1993 Accomplishments:
- (U) Designed critical experiments for advanced fusion passive surveillance and radar ID techniques utilizing C3 and surveillance resources; conducted initial development of integrated bistatic and electronic support measures algorithms to evaluate airframe ID. ($287K)
- (U) Conducted coding of advanced multi-sensor fusion algorithm for installation and test on Rome Laboratory (RL) multiple sensors. ($650K)
- (U) Conducted initial Joint Surveillance Targeting and Reconnaissance System (JSTARS) Cueing and Correlation technology demonstration effort. ($450K)

(U) FY 1994 Planned Program:
- (U) Develop high-confidence hostile airborne target identification and tracking technologies and concepts; develop and evaluate aircraft ID algorithms; integrate organic RL sensors for target ID experiments; develop advanced multi-sensor fusion algorithms. ($1,788K)
- (U) Develop and demonstrate advanced sensor technologies and concepts for assured detection and tracking of hostile ground targets using multiple off-board sensors: develop off-board cueing methodologies; complete JSTARS correlation design. ($3,200K)

(U) FY 1995 Planned Program:
- (U) Develop high-confidence hostile airborne target identification and tracking technologies and concepts; develop passive aircraft ID algorithms; demonstrate advanced radar processing and multi-sensor fusion algorithms. ($2,470K)
- (U) Develop and demonstrate advanced passive sensor technologies and concepts for increased survivability of fielded systems and assured detection and tracking of combat threats; develop advanced bistatic tracking algorithms and a test-bed preliminary design. ($200K)

Program Element: #0603789F
PE Title: Command, Control, and Communications (C3) Advanced Technology Development
Budget Activity: #3. Advanced Development
Old Budget Activity: #2. Advanced Technology Development

Date: February 1994

- (U) Develop and demonstrate advanced sensor technologies and concepts for assured detection and tracking of hostile ground targets using multiple off-board sensors; complete real-time Joint Surveillance Targeting and Reconnaissance System (JSTARS) on-board sensor management capability on advanced computer system architecture. ($2,400K)

(U) Work Performed By: This project is managed by Rome Laboratory, Griffiss AFB, NY. The major contractors are: Syracuse Research, Syracuse, NY; Technology Services Corp., Trumbell, CT; Harris Corp., Melbourne, FL; Calspan Corp., Buffalo, NY; and Grumman, Melbourne, FL.

(U) Related Activities:
- (U) PE 0603203F, Advanced Avionics for Aerospace Vehicles.
- (U) PE 0602702F, C3.
- (U) PE 0603742F, Combat Identification Technology.
- (U) PE 0603726F, C3 Subsystems Integration.
- (U) PE 0603728F, Advanced Computer Technology.
- (U) PE 0603238F, Global Surveillance and Communications.
- (U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate duplication.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0603800F
PE Title: Joint Advanced Strike Technology (JAST) Program
Project Number: 2025
Budget Activity : 4 Demonstration and Validation
Old Budget Activity: N/A
Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2025 Joint Advance Strike Technology (JAST) Program:								
0	0	101.354	151.975	200.860	305.806	415.703	CONT	CONT
Total								
0	0	101,354	151,975	200,860	305,806	415,703	CONT	CONT

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Joint Advanced Strike Technology (JAST) Program was established to support development of affordable next generation strike weapon systems/fighter aircraft as a result of the Office of the Secretary of Defense (OSD) Bottom-Up Review (BUR). The program will focus on key technologies to meet future joint operational requirements for Navy, Air Force, and Marine Corps while reducing cost and risk. Since the emphasis is on maturing and demonstrating those technologies, components, concepts and manufacturing processes which optimize commonality between the Services' next generation strike weapon systems, through prudent use of design modularity and common components, it is included in Budget Activity 4, Demonstration and Validation.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program: Not Applicable

2. (U) FY 1994 Planned Program:
Conduct concept exploration studies and provide in-house support as follows (breakout below reflects Navy funding):
($11,880) Strike warfare concepts
($7,263) Strategy-to-technology analysis
($3,290) Air vehicle
($1,190) Propulsion
($3,220) Manufacturing and supportability
($720) Avionics and weapons integration
($2,100) Program operations support

Program Element: 0603800F
PE Title: Joint Advanced Strike Technology (JAST) Program
Project Number: 2025
Budget Activity : 4 Demonstration and Validation
Old Budget Activity: N/A
Date: February 1994

3. (U) FY 1995 Planned Program:
Complete concept exploration, begin concept development and provide in-house support as follows (breakout below reflects combined Navy and Air Force funding):
($23,870) Air vehicle
($8,560) Manufacturing and producibility
($63,240) Propulsion
($27,400) Avionics
($4,220) Weapons integration
($14,760) Supportability
($12,951) Strategy-to-technology analysis
($40,790) Strike weapons systems concept studies
($5,600) Program operations support

4. (U) Program to Completion: Complete concept development and begin concept demonstration around 1997.

D. (U) WORK PERFORMED BY: IN-HOUSE: AFMC, Dayton , OH, Fort Walton Beach, FL; NAVAIRWARCENACDIV, Patuxent River, MD, Warminster, PA. CONTRACTORS: To be determined.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable for this submission.

2. (U) SCHEDULE CHANGES: Not applicable for this submission.

3. (U) COST CHANGES: Not applicable for this submission.

F. PROGRAM DOCUMENTATION: OSD Bottom -Up Review (BUR) 9/93

G. RELATED ACTIVITIES: ASTOVL is currently a separate and distinct program from JAST. However, in the future, the JAST Program will assess ASTOVL as a candidate for one of its flying concept demonstrators based on ASTOVL program progress and ASTOVL's capability to satisfy the requirements of more than one service (ASTOVL PEs 0603217N and 0603226E).

Program Element: 0603800F
PE Title: Joint Advanced Strike Technology (JAST) Program
Project Number: 2025
Budget Activity : 4 Demonstration and Validation
Old Budget Activity: N/A
Date: February 1994

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): This is a joint program, with no executive service. Navy and Air Force each provide approximately equal shares of annual funding for the program effective FY 1995.

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation RDT&E,N, Budget Activity 4, (PE 0603800N) Program Title Joint Advanced Strike Technology (JAST) Program								
0	29,663	100,037	151,652	202,857	305,446	409,275	CONT	CONT

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604201F
Date: February 1994
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2257 Standard Avionics/Joint Service Review Committee (JSRC) Initiatives								
2,363	2,485	2,510	2,533	2,511	5,608	5,719	Cont	TBD
2258 Standard Inertial Navigation Unit (INU)								
2,551	95	0	0	0	0	0	0	26,849
2297 Embedded Computer Software Standardization (ECSS)								
1,322	0	0	0	0	0	0	TBD	TBD
2560 High Order Language Control Facility (LCF)								
472	0	0	0	0	0	0	TBD	TBD
2658 Avionics Architecture Implementation and Support (AAIS)								
472	0	0	0	0	0	0	TBD	TBD
3264 Standard Flight Data Recorder (SFDR)								
2,929	287	0	0	0	0	0	0	37,359

Program Element: #0604201F **Date:** February 1994
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

4017 Compass/Attitude & Heading Reference System (C/AHRS)

4.985	3.703	2.314	3.704	2.787	467	187	Cont	TBD
Total								
15,094	6,570	4,824	6,237	5,298	6,075	5,906	TBD	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element explores and develops standard avionics architecture and equipment which will reduce acquisition and support costs, increase weapon system performance and availability, and foster technology evolution and insertion for operational force improvements. Since this program element is devoted to the Engineering and Manufacturing Development (EMD) of standard avionics architecture and equipment, it is included in budget activity 5 (EMD). The scope is both domestic and international. Reliability and Maintainability (R&M) play a major role in the identification of specific development efforts within this element as evidenced by the evolution of the Standard Inertial Navigation Unit, the Standard Central Air Data Computer, the Standard Flight Data Recorder and the Compass/Attitude & Heading Reference System. Joint avionics development efforts are pursued through participation in and support of the Joint Service Review Committee (JSRC) and as the DoD delegated Lead Standardization Activity for Avionics. Current initiatives include the Standard Flight Data Recorder and the Compass/Attitude & Heading Reference System. Development, enhancement, and maintenance of MIL-STD-1750/1815 embedded computer software support tools are supported. Ongoing support activities, such as the High Order Language Control Facility and the Avionics Architecture Implementation and Support program, are activities that help ensure maintenance of credible software standardization.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) Project 2257, Standard Avionics and Joint Service Review Committee (JSRC) Initiatives: Project identifies/develops candidate systems for standardization in the Air Force through the JSRC. As the DoD Lead Service Activity (LSA) for Avionics, identifies/develops candidate systems for joint services standardization. Maintains/updates the Air Force Avionics Roadmap, Avionics Planning Baseline, and avionics database. Supports international avionics initiatives and standardization activities.

(U) FY 1993 Accomplishments:
(U) - Published updated AF Avionics Roadmap. ($0.39M) Sep 93.

Program Element: #0604201F
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

Date: February 1994

(U) - Continued front-end work to identify avionics standardization opportunities through Air Force, JSRC, and DoD LSA process. ($0.46M) Ongoing.
(U) - Continued Modular Avionics Standardization Architecture (MASA) demonstration/validation and Tanker/Transport Common Radar (TTCR) development; initiated T-38 conceptual demonstration activities. ($0.64M) Ongoing.
(U) - Reviewed participation in the Joint Low Probability of Intercept (LPI) radar altimeter program. ($0.2M) Ongoing.
(U) - Continued High Speed Data Bus (HSDB) certification. ($0.10M) Ongoing.
(U) - Completed limited demonstration of Embedded Global Positioning System with an Inertial Navigation System (EGI). (NSP) Jun 93.

(U) FY 1994 Plans
(U) - Continue front-end work to identify avionics standardization opportunities through Air Force, JSRC, and DoD LSA processes -- potential developments include the Standard Control Display Navigation Unit (SCDNU). ($0.380M) Ongoing.
(U) - Award EGI system contract. ($0.73M) Feb 94.
(U) - Continue MASA demonstration/validation and TTCR development (conduct formal SRR on T-38 MASA avionics upgrade). ($1.125M) Ongoing.
(U) - Update Avionics planning baseline ($0.20M) Sep 94.
(U) - Functional Avionics Life Cycle Cost Model (FALCCM) program ($0.05M) terminated Dec 93.

(U) FY 1995 Plans:
(U) - Continue tri-service standardization opportunities via the JSRC and DoD LSA processes ($0.36M) Ongoing.
(U) - Continue TTCR development. ($0.40M) Ongoing.
(U) - Initiate contract for T-38 MASA avionics upgrade. ($0.75M)
(U) - Continue development of EGI system. ($0.80M) Ongoing.
(U) - Continue Avionics Planning Baseline. ($0.20M) Sep 95.
(U) - MASA Electronic Cockpit. (NSP) Ongoing.

(U) To Complete:
(U) - Continue development and provide initial hardware deliveries for an embedded GPS/INS system. ($0.84M)
(U) - Continue tri-service standardization opportunities via the JSRC and DoD LSA processes. ($0.57M) Ongoing.

Program Element: #0604201F **Date: February 1994**
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

(U) - Continue TTCR program. ($0.40M) Ongoing.
(U) - Continue MASA Electronic Cockpit. (NSP) Ongoing.

(U) Work Performed By: The Common Avionics Directorate, Subsystems Program Office, Aeronautical Systems Center (ASC), Air Force Material Command (AFMC), Wright-Patterson AFB OH, provides program management. Major contractors are Draper Labs, Cambridge, MA ARINC, Annapolis MD; TASC, Fairborn OH, and Atlantic Research Corp, Fairborn OH.

(U) Related Activities:
(U) - PE #0603253F, Advanced Avionics Integration.
(U) - PE #0604609F, RAMTIP.
(U) - PE #0708026F, PRAM.
(U) - The Joint Service Review Committee (JSRC), under the Joint Logistics Commanders, coordinates similar efforts. PEs #64203N (US Navy) and #64201A (US Army) also support JSRC.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: International collaborative avionics efforts are currently monitored via the Allied Standard Avionics Architecture Council (ASAAC).

(U) Project 2258, Standard Inertial Navigation Unit (INU): Develops Air Force standard form, fit, function (F3) medium accuracy (0.8nm/hr) INU for A-7, C-130, F/RF-4, F-15, F-16, F/EF-111, F-117, MH-53J, and Army OV-1, enhanced accuracy (0.4nm/hr) INU for the F-117A, and precision accuracy (SPA) (0.2nm/hr) INUs for MC-130, AC-130, and Joint STARS. Applies ring laser gyro (RLG) technology in Air Force standard F3 medium accuracy INU. Major remaining effort is development of INU depot support equipment (SE).

(U) FY 1993 Accomplishments:
(U) - Developed maintenance & test sets and software for SPA INU. (NSP)
(U) - Continued work on precision accuracy INU SE development and depot residual tasks. (NSP)

Program Element: #0604201F **Date: February 1994**
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

(U) FY 1994 Plans:
(U) - Complete system development activities; transfer residual tasks to depot. (NSP)

(U) FY 1995 Plans:
(U) - None. Project completed in FY94.

(U) To Complete:
(U) - None. Project completed in FY94.

(U) Work Performed By: Major contractors are Honeywell, Clearwater, FL, and Litton, Woodland Hills CA (medium accuracy RLG INU); and Kearfott, Little Falls NJ (precision accuracy INU). The Common Avionics Division, Subsystems Program Office, ASC, Wright-Patterson AFB OH, provides program management.

(U) Related Activities:
(U) - PE #0701112F, Inventory Control Point Operations.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

(U) Project 2297, Embedded Computer Software Standardization: Develop support software to implement standardization efforts such as MIL-STD-1815 (Ada Programming Language) and MIL-STD-1750A (Air Force Standard 16 Bit Instruction Set Architecture Computer).

(U) FY 1993 Accomplishments:
(U) - Established software architectural requirements for next generation avionics hardware. Not separately priced (NSP)

Program Element: #0604201F
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

Date: February 1994

(U) FY 1994 Plans:
(U) - None. Projects completed in FY 93.

(U) FY 1995 Plans:
(U) - None. Projects completed in FY 93.

(U) To Complete:
(U) - None. Projects completed in FY 93.

(U) Work Performed By: Major contractor is Boeing Military Airplane Company, Wichita KS (subcontracted to Intermetrics Inc, Cambridge MA). The Common Avionics Division, Embedded Computer Standardization Program Office, ASC, Wright-Patterson AFB OH, provides program management.

(U) Related Activities:
(U) - PE #0602204F, Aerospace Avionics.
(U) - PE #0603226F, DoD Common Programming Language, Advanced Development.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

(U) Project 2560, High Order Language Control Facility (HOLCF): Acts as a service organization to support USAF and DoD High Order Language (HOL) standardization efforts. HOL standardization assists in reducing computer software acquisition, operation, and maintenance costs by facilitating the development of reliable, maintainable, and reusable software. The HOLCF is responsible for centralized control of the JOVIAL J73 programming language, and DoD Ada programming language standardization.

(U) FY 1993 Accomplishments:

Program Element: #0604201F **Date: February 1994**
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

(U)- Completed validation of JOVIAL and Ada compilers. Not Separately Priced (NSP)

(U) FY 1994 Plans:
(U)- None. Projects completed in FY93.

(U) FY 1995 Plans:
(U)- None. Projects completed in FY93.

(U) To Complete:
(U)- None. Projects completed in FY93.

(U) Work Performed By: The Computer Operations Directorate, ASC, Wright-Patterson AFB OH, provides program management.

(U) Related Activities: None. There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

(U) Project 2658, Avionics Architecture Implementation and Support (AAIS): Supports Systems Engineering Avionics Facility, which provides and develops avionics architectural standards (e.g., MIL-STD-1553 and MIL-STD-1760). Performs validation testing/engineering support for new/existing architecture's, and investigates/develops new standards.

(U) FY 1993 Accomplishments:
(U)- Completed MIL-STD-1553B and 1750A testing. (NSP)
(U)- Completed support of 32-bit computer architecture standard. (NSP)

(U) FY 1994 Plans:
(U)- None. Projects completed in FY93.

Program Element: #0604201F **Date:** February 1994
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

(U) FY 1995 Plans:
(U)- None. Projects completed in FY93.

(U) Work Performed By: The Common Avionics Division, Subsystems Program Office, ASC, Wright-Patterson AFB OH, provides program management.

(U) Related Activities:
(U)- PE #0603226F, DoD Common Programming Language, Advanced Development.
(U)- There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: NATO Standardization Agreement (STANAG) version of MIL-STD-1760 is in development. Supports information exchange with Air Standardization Coordinating Committee (ASCC).

(U) Project 3264, Standard Flight Data Recorder (SFDR): A Joint Service Review Committee-sponsored initiative to develop a standard crash survivable flight data recorder for various Air Force aircraft.

(U) FY 1993 Accomplishments:
(U)- Continued development of SFDR depot SE. ($.25M)
(U)- Completed LRIP deliveries. ($.65M)
(U)- Made first full rate production delivery.
(U)- Completed Data Transfer Interface Unit (DTIU) development. (NSP)

(U) FY 1994 Plans:
(U)- Complete development of SFDR depot SE. ($.287M)

(U) FY 1995 Plans:
(U)- None. Projects completed in FY94.

Program Element: #0604201F **Date:** February 1994
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

(U) To Complete:
(U)- None. Projects completed in FY94.

(U) Work Performed By: Major contractor is Smiths Industries, Grand Rapids MI. The Common Avionics Division, Subsystems Program Office, ASC, Wright-Patterson AFB OH, provides program management.

(U) Related Activities: There are other Army and Navy contractors for Flight Data Recorder Systems, however, none with the capability of the SFDR. There is no unnecessary duplication of effort within the Air Force or the DoD.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

(U) Project 4017, Compass/Attitude & Heading Reference System (C/AHRS): Joint Service Review Committee-supported program. Develops functional replacement systems for several existing compass systems and C/AHRSs for use in various Air Force and Navy aircraft. Tri-service MOA includes the Army as a potential user.

(U) FY 1993 Accomplishments:
(U)- Completed Preliminary Design Review (PDR) - Nov 92, and Critical Design Review (CDR) - Jul 93. (NSP)
(U)- Completed study/definition phase for potential AF and Army platforms. ($.10M)

(U) FY 1994 Plans:
(U)- Continue design/development of units for qualification/durability and flight testing. ($3.403M)
(U)- Begin fabrication of units for flight/qualification/durability testing. ($.30M)

(U) FY 1995 Plans:
(U)- Continue system development. ($.03M)
(U)- Begin flight/qualification/durability testing. ($2.40M)

Program Element: #0604201F
PE Title: Aircraft Avionics Equipment Development
Budget Activity : #5 - Engineering & Manufacturing Development
Old Budget Activity : #4 Tactical Programs

Date: February 1994

(U) To Complete:
(U)- Continue system development. ($.02M)
(U)- Complete qualification/durability testing. ($.02M)
(U)- Continue flight testing. ($.02M)

(U) Work Performed By: Major contractor is Smiths Industries, Grand Rapids MI. The Common Avionics Division, Subsystems Program Office, ASC, Wright-Patterson AFB OH, provides program management.

(U) Related Activities: There exists a tri-service (Army, Navy, Air Force) Memorandum Of Agreement (MOA) governing the development of the C/AHRS program. There is no unnecessary duplication of effort within the Air Force or the DoD.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604218F
PE Title: Engine Model Derivative Program (EMDP)
Budget Activity : #5 - EMD
Old Budget Activity : #4 - Tactical Programs

Date: February, 1994

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2634 Engine Model Derivative Program (EMDP)								
945	854	761	760	743	776	814	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: EMDP is an Engineering and Manufacturing Development (EMD) program that provides the latest engine technology advances to current weapon systems and provides a framework for engine development for future systems. EMDP contributes to system life extension, reduced life cycle cost, and enhanced performance. Enhanced performance is required to counter increases in system weight and increased threat capability. EMDP demonstrates derivative engine concepts incorporating advanced technology and components from government and contractor funded programs. EMDP demonstrates advances in performance, durability, operability, supportability, reliability, maintainability, and unique capabilities, such as thrust reversing and vectoring nozzles. These demonstrations are in prototype derivatives of existing engines prior to full scale development. Early demonstration of improved engine characteristics significantly reduces risk and shortens engine development and qualification, allowing quick, cost-effective response to weapon system needs. EMDP also evaluates candidate engines (commercial or military) to provide competitive engine opportunities. EMDP ensures the Air Force has propulsion alternatives to meet near- and far-term needs.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10M IN FY 1995:

(U) 2634, Engine Model Derivative Program: EMDP plans for and sustains the engineering development necessary to provide increased performance, reduced life cycle cost and system life extension for air breathing engines for current and future systems.

(U) FY 1993 Accomplishments:
(U) - Completed F-111 propulsion study. ($100,000)
(U) - Completed qualification effort of the 1000 lb thrust class engine for unmanned vehicles. ($160,000)
(U) - Initiated effort to support contractor demonstrations of thrust vectoring nozzles, low observable technology, advanced controls and accessories, and thrust growth for Increased Thrust Derivative Engines. ($189,000)

Program Element: #0604218F
PE Title: Engine Model Derivative Program (EMDP)
Budget Activity : EMD
Old Budget Activity : #4 - Tactical Programs

Date: February, 1994

(U) - Continued to analyze current engines for future derivative potential and revise roadmaps to meet MAJCOM requirements. ($496,000)

(U) FY 1994 Plans:
(U) - Continue Increased Thrust Derivative Engine design effort and revise roadmaps to meet MAJCOM requirements. ($200,000)
(U) - Initiate AGM-130 Integrated Propulsion Module Inlet design and fabrication and begin inlet static and wind tunnel testing. ($450,000)
(U) - Continue F110X/F100X design studies. ($204,000)

(U) FY 1995 Plans:
(U) - Continue Increased Thrust Derivative Engine design effort. ($100,000)
(U) - Complete AGM-130 Integration. ($500,000)
(U) - Continue to analyze current engines for future derivative potential and revise roadmaps to meet MAJCOM requirements. ($161,000)

(U) WORK PERFORMED BY: EMDP is managed by the Subsystem System Program Office (SPO) at Aeronautical Systems Center, Wright-Patterson AFB OH. The contractors (and engines) involved are; Pratt & Whitney (P&W), West Palm Beach FL (F100, F117); General Electric Company (GE), Evendale OH (F110); Williams International, Walled Lake MI (FJ44, F107, F112, F121, P8300); Allison, Indianapolis IN (Model 150, 250 propfan, T56); Teledyne CAE, Toledo OH (235 propfan, Model 382-12, 318-1, 384-4A); and Garrett Corporation, Phoenix AZ (ETJ1081, F124/F125, F109).

(U) RELATED ACTIVITIES:
(U) - PE # 0603202F, Aircraft Propulsion Subsystem Integration, provides fan and low pressure turbine technology
(U) - PE # 0603216F, Advanced Turbine Engine Gas Generator, provides compressor, combustor, and high pressure turbine technology
(U) - PE # 0602203F, Aerospace Propulsion, provides additional component and engine test data
(U) - PE # 0708011F, Industrial Preparedness Program, provides materials processing and component fabrication demonstration
(U) - Activities conducted by the Army, Navy, National Aeronautics and Space Administration, and propulsion industry Independent Research and Development (IR&D)
(U) - PE # 0604268F, Aircraft Engine Component Improvement Program, complements EMDP by addressing engine safety problems, service-revealed deficiencies, and improved reliability

Program Element: #0604218E
PE Title: Engine Model Derivative Program (EMDP)
Budget Activity : EMD
Old Budget Activity : #4 - Tactical Programs

Date: February, 1994

(U) - The Air Force and Navy have a broad memorandum of understanding for joint cooperative propulsion programs in areas of common interest
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) OTHER APPROPRIATION FUNDS: Not applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604222F **Date:** February 1994
PE Title: Nuclear Weapons Support
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defensewide Mission Support

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
4236 Engineering Analysis								
1,135	1,145	1,204	1,264	1,315	1,402	1,500	Cont	TBD
5708 Nuclear Weapons Support								
4,161	4,300	4,433	4,529	4,510	4,598	4,678	Cont	TBD
Total								
5,296	5,445	5,637	5,793	5,825	6,000	6,178	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: Provides funds for maintaining core USAF nuclear weapon system expertise. Includes in-house technical capabilities, contractual efforts, supplies and equipment, travel, and salaries of the San Antonio Air Logistics Center, Product Group Manager for Nuclear Weapons, Nuclear Weapons Integration Division's civilian nuclear weapon specialists at Kirtland Air Force Base. Provides technical guidance for improved weapon development, stockpile management and retirement, compatibility, interoperability, safety, surety, and security. Customers are: DoD (Air Force, Navy and Defense Nuclear Agency [DNA]), DOE, and NATO. Supports US Strategic Command and Air Combat Command Required Operational Capability 16-71 (Peacekeeper), 12-76 (Air Launched Cruise Missile), 6-76 (B61 Strategic Bomb), 6-69 (B83 Modern Strategic Bomb), and SAC's System Operational Requirements Document 13-82-III (Advanced Cruise Missile). Air Force representative for the planning and implementation of the Joint DoD-DOE Surety Plan. This plan documents nuclear weapon issues which benefit from the application of risk assessment, data collection, and model development. The Nuclear Weapons Integration Division is responsible for all USAF nuclear weapons development, systems engineering, and nuclear surety engineering and improvement. These efforts are in the RDT&E

Program Element: #0604222F **Date:** February 1994
PE Title: Nuclear Weapons Support
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defensewide Mission Support

research category 6.5, Engineering and Manufacturing Development. This engineering and R&D work is tied to the DOE nuclear weapons development process independent of the DoD acquisition system. Weapons are always undergoing some form of RDT&E due to safety and reliability improvements. Analysis and engineering development of USAF platforms is required to ensure compatibility and safety of nuclear systems. Funding this element is essential to maintaining current safety and reliability levels in the US nuclear stockpile.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 4236, Engineering Analysis:
Funds San Antonio Air Logistic Center, Nuclear Weapons Integration Division's engineering analysis performed on contract for all nuclear weapon systems. Contractors provide technical expertise unavailable through organic resources in critical areas of nuclear weapons safety and security.

(U) FY 1993 Accomplishments:

(U) - Nuclear Aircraft System Support. Formatted nuclear weapons loading, delivery, warhead mate and demate technical orders; provided Aircraft Monitor and Control (AMAC) software analysis for the F-16C/D and B-1B; developed updated AMAC surveillance test capability; provided technical expertise for nuclear weapon integration on non-US aircraft systems; provided technical expertise on nuclear weapon digital communication safety, operability and reliability. ($447)

(U) - Nuclear Weapons/Systems Assessments. Evaluated alternate technologies to aid in safe, effective USAF recovery/recapture operations of nuclear weapons in storage, in transit, or on alert; completed requirements analysis for the Nuclear Weapons Data Base (NWBD); developed initial system/segment specification and software requirement specifications for NWDB. ($688)

(U) FY 1994 Plans:

(U) - Nuclear Aircraft System Support. Format nuclear weapons loading, delivery, warhead mate and demate technical orders; support the nuclear hardness data base; develop computer aided logistics support (CALS) capability for AF-DOE interconnectivity to the Joint Nuclear Weapons Publication System; provide AMAC software analysis for the B-52 and F-16 software upgrades; provide technical expertise for continued nuclear weapons integration on non-US aircraft systems. ($219)

Program Element: #0604222F
Date: February 1994
PE Title: Nuclear Weapons Support
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defensewide Mission Support

(U) - Nuclear Ground-Launched Missile Support. Provide technical expertise for developing nuclear surety design criteria, standards, specifications and related requirements documents for all USAF ground launched missile systems; provide technical support for Nuclear Weapon System Safety Group safety studies of major Minuteman modifications. ($300)

(U) - Nuclear Weapons Program Support. Provide technical expertise to support development and updates of nuclear weapon stockpile-to-target sequences; document and support weapon safety analyses; provide technical support on accident resistant shipping containers, use control, long term storage and dismantlement. ($390)

(U) - Nuclear Weapons/Systems Assessments. Develop the system performance specification for the nuclear weapon data base into a functional data base. ($236)

(U) FY 1995 Plans:

(U) - Nuclear Aircraft System Support. Continue FY 1994 level of effort: format nuclear weapons loading, delivery, warhead mate and demate technical orders; continue support on the nuclear hardness data base; provide Aircraft Monitor and Control (AMAC) software analysis and technical expertise for continued nuclear weapons integration on non-US aircraft systems. ($195)

(U) - Nuclear Ground-Launched Missile Support. Continue FY 1994 level of effort: provide technical expertise for developing nuclear surety design criteria, standards, specifications and related requirements documents for all USAF ground launched missile systems; provide technical support to Nuclear Weapon System Safety Group safety studies. ($239)

(U) - Nuclear Weapons Program Support. Continue FY 1994 level of effort: provide technical expertise to support development and update of nuclear weapon stockpile-to-target sequences; document and support weapon safety analyses; provide technical support on accident resistant shipping containers, use control, long term storage and dismantlement. ($325)

(U) - Nuclear Weapons/Systems Assessments. Continue FY 1994 level of effort: provide technical assessments and support on nuclear safety analyses and special studies. ($445)

Program Element: #0604222F **Date:** February 1994
PE Title: Nuclear Weapons Support
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defensewide Mission Support

(U) Work Performed By: Orion International, Albuquerque, New Mexico; Brookhaven National Laboratory, Upton, New York; Horizons Technology, Inc., San Diego, California; Albuquerque Logistics, Inc., Albuquerque, New Mexico; Tech Reps, Inc., Albuquerque, New Mexico.

(U) Related Activities:
(U) - PE 0603308F, Strategic Missile Modernization.
(U) - PE 0101215F, Peacekeeper.
(U) - PE 0101213F, Minuteman Squadrons.
(U) - PE 0604361F, Air Launched Cruise Missile; PE 0603319F, Advanced Cruise Missile (ACM); PE 0101120F, ACM.
(U) - PE 0101113F, B-52 Offensive Avionics System.
(U) - PE 0101118F, Short Range Attack Missile A.
(U) - PE 0101126F, B-1B; PE 0604226F, B-1B; PE 0101127, B-2.
(U) - PE 0207130F/0207134F, F-15E Squadrons.
(U) - PE 0207590F Aircraft Stores Certification (SEEK EAGLE/Nuclear).
(U) - There is no unnecessary duplication of effort within the USAF or Department of Defense.

(U) Other Appropriation Funds: DOE RD&T, production, and surveillance are funded separately in DOE TOA at $1-3 billion plus per year.

(U) International Cooperative Agreements: NATO agreements created on a weapon system by weapon system basis when US assets are used.

2. (U) Project 5708, Nuclear Weapons Support:
Funds San Antonio Air Logistic Center, Nuclear Weapons Integration Division's civilians providing technical support for all new and fielded USAF nuclear weapon systems.

(U) FY 1993 Accomplishments:
(U) - Nuclear Aircraft System Support. Provided technical support to NATO PA-200 and F-16 operational safety reviews; provided technical support for F-111 aircraft; supported B-2 and C-17 nuclear weapons technical orders;

Program Element: #0604222F **Date:** February 1994
PE Title: Nuclear Weapons Support
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defensewide Mission Support

MHU-204 trailer for the B-2; established nuclear hardness database center; supported Weapons Storage and Security System software changes; continued nuclear certification analyses and recommendations IAW AFI 91-103, *USAF Nuclear Certification Program*, as well as other compatibility testing and analyses; completed various safety analyses for F-16 aircraft, B-2 nuclear compatibility test planning, intent unique signal report, F-15E pre-operational safety review, studies on C2 periodic and surveillance testing requirements, and C-141/C-130 Prime Nuclear Airlift Force (PNAF) safety study. ($1,338)

(U) - Nuclear Ground-Launched Missile Support. Continued nuclear certification analyses and recommendations IAW AFI 91-103, review of operational certification technical order procedure changes, nuclear weapon safety studies and compatibility testing and analyses; supported weapon system threat and security analyses, supported Nuclear Weapon Safety Study Group Minuteman and Peacekeeper operational safety reviews. ($665)

(U) - Nuclear Weapons Program Support. Supported the Defense Nuclear Agency Fire Resistant Enhancement Study, the Joint Staff's inactive reserve storage/maintenance/retrofit issues study, and the Assistant Secretary of the USAF for Acquisition (SAF/AQQ) regarding START I implementation planning; supported impact analysis of Federal Advisory Committee on Fail-Safe and Risk Reduction (FARR) study implementation, W78/W87 weapon system safety study, weapon modernization and inactive reserve enhancement efforts, and the SAF/AQQ *Weapons of Mass Destruction Special Study*; conducted B83-1 Special Design Review and Assistance Group meeting; briefed Red Team and provided support for Red Team activities on the W80 warhead; supported concept development and implementation of Secure Recode System; continued High Power Radio Frequency (HPRF) phase 2 weapons development study; continued support for USAF nuclear weapon stockpile activities, retirements and nuclear safe escape effort; completed *Advanced Weapons Technology Study*; published *SRAM-T Phase 2 Study Final Report* and *Nth World Conference Final Report*; completed study of alternate technologies for weapon recapture and recovery operations. ($728)

(U) - Nuclear Weapons/Systems Assessments. Completed B83-1 nuclear safety analysis; provided support for Joint Staff's inactive reserve storage/maintenance/retrofit study, supported impact analysis of Federal Advisory Committee on Fail-Safe and Risk Reduction (FARR) study implementation, W78/W87 Weapon system safety study, weapon modernization and inactive reserve enhancement efforts; provided support for Red Team activities on W80 warhead; conducted fault tree analysis of various systems, such as the B61 weapon and B-2 systems, and a special assessment of Kirtland Underground Munitions Storage Complex. ($1,430)

Program Element: #0604222F
Date: February 1994
PE Title: Nuclear Weapons Support
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defensewide Mission Support

(U) FY 1994 Plans:

(U) - Nuclear Aircraft System Support. Continue FY 1993 level of effort: support US Strategic Command's nuclear safe escape effort; update/expand nuclear hardness data base center and index Nuclear Weapons Integration technical data; develop H1473/H1545 cargo aircraft and ground handling constraint configurations; support Nuclear Weapon System Safety Group action items from Prime Nuclear Airlift Force special safety study; perform nuclear safety certification assessment of the Air Launched Cruise Missile operational flight software; accomplish a requirements analysis and develop system specifications for nuclear weapons data base comprised of aircraft compatibility and safety documents; review SEEK EAGLE certification package for adaptation to nuclear requirements; conduct B-1B block 4.5m3 compatibility test; conduct F-16C/D block 40 tape 4 and block 50 tape 2 nuclear safety analysis; support nuclear safety certification of C-5B for Prime Nuclear Airlift Force missions, F-111 aircraft and weapon systems, and design, development, standardization and procurement of stores management system for nuclear weapons command and control; provide nuclear surety design criteria, standards, specifications and related requirements documents for all USAF nuclear-capable aircraft weapon systems; continue C-17 nuclear safety certification efforts; revise and validate TO 1F-15E-16, nuclear weapons information and loading procedures; complete nuclear safety evaluation of B-52H conventional enhancement modification; begin F-111, B-52H and B-1B nuclear effects vulnerability analyses for sure safe delivery. ($1,283)

(U) - Nuclear Ground-Launched Missile Support. Continue FY 1993 level of effort: support START I and START II treaties; provide nuclear surety design criteria, standards, specifications and related requirements documents for all USAF ground launched missile systems; support Nuclear Weapon System Safety Group (NWSSG) safety studies of major Minuteman modifications. ($721)

(U) - Nuclear Weapons Program Support. Continue FY 1993 level of effort: continue High Power Radio Frequency (HPRF) Phase 2 study; accomplish nuclear weapon safety and compatibility studies, support USAF nuclear weapon stockpile activities and weapon use control analysis techniques; initiate follow-on studies to the advanced weapons technology study and the W84 special weapon study; participate in DOE phase 1 and 2 studies; support use control system development implementation for the HPRF program; support environmental and intrinsic radiation studies; continue support to USAF, DoD and other agencies in all facets of nuclear arsenal. ($1,374)

Program Element: #0604222F
PE Title: Nuclear Weapons Support
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defensewide Mission Support

Date: February 1994

(U) - Nuclear Weapons/Systems Assessments. Continue FY 1993 level of effort: conduct Kirtland Underground Munitions Storage Complex containment calculations of detonation by-products for existing blast door configuration; assist DNA in prime nuclear airlift force portion of W78/W87 system safety study; develop joint DoD/DOE nuclear surety assessment methodology; conduct fault tree analysis of W80, W78/W87, B61 weapons and B-2 systems; propose revised USAF Materiel Command nuclear policy. ($922)

(U) FY 1995 Plans:

(U) - Nuclear Aircraft System Support. Continue FY 1994 level of effort: support to US Strategic Command's nuclear safe escape effort; update/expand nuclear hardness data base center and index Nuclear Weapons Integration technical data; support Nuclear Weapon System Safety Group action items as required; perform nuclear safety certification assessments; continue to develop system specifications for nuclear weapons data base comprised of aircraft compatibility and safety documents; conduct nuclear safety analysis; support design, development, standardization and procurement of stores management system for nuclear weapons command and control; provide nuclear surety design criteria, standards, specifications and related requirements documents for all USAF nuclear-capable aircraft weapon systems. ($1,310)

(U) - Nuclear Ground-Launched Missile Support. Continue FY 1994 level of effort: support START I and START II treaties; provide nuclear surety design criteria, standards, specifications and related requirements documents for all USAF ground launched missile systems; support Nuclear Weapon System Safety Group (NWSSG) safety studies. ($757)

(U) - Nuclear Weapons Program Support. Continue FY 1994 level of effort: accomplish nuclear weapon safety and compatibility studies, support USAF nuclear weapon stockpile activities and weapon use control analysis techniques; participate in DOE phase 1 and 2 studies; support environmental and intrinsic radiation studies; continue support to USAF, DoD and other agencies in all facets of nuclear arsenal. ($1,371)

(U) - Nuclear Weapons/Systems Assessments. Continue FY 1994 level of effort: develop joint DoD/DOE nuclear surety assessment methodology; conduct fault tree analyses of nuclear weapons and weapon systems; provide other special assessments as required. ($995)

Program Element: #0604222F **Date:** February 1994
PE Title: Nuclear Weapons Support
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defensewide Mission Support

(U) Work Performed By: San Antonio Air Logistic Center, Nuclear Weapons Integration Division at Kirtland AFB, New Mexico.

(U) Related Activities:
- (U) - PE 0603308F, Strategic Missile Modernization.
- (U) - PE 0101215F, Peacekeeper.
- (U) - PE 0101213F, Minuteman Squadrons.
- (U) - PE 0604361F, Air Launched Cruise Missile; PE 0603319F, Advanced Cruise Missile (ACM); PE 0101120F, ACM.
- (U) - PE 0101113F, B-52 Offensive Avionics System.
- (U) - PE 0101118F, Short Range Attack Missile A.
- (U) - PE 0101126F, B-1B; PE 0604226F, B-1B; PE 0101127, B-2.
- (U) - PE 0207130F/0207134F, F-15E Squadrons.
- (U) - PE 0207590F Aircraft Stores Certification. (SEEK EAGLE/Nuclear)
- (U) - There is no unnecessary duplication of effort within the USAF or Department of Defense.

(U) Other Appropriation Funds: DOE RD&T, production, and surveillance are funded separately in DOE TOA at $1-3 billion plus per year.

(U) International Cooperative Agreements: NATO agreements created on a weapon system by weapon system basis when US assets are used.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604226F
Date: February 1994
PE Title: B-1
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
4143 Conventional Weapons Upgrade								
62,390	49,000	71,619	130,016	98,782	81,073	162,869	507,261	1,163,010
1019 Electronic Countermeasures (ECM) Improvements								
18.207	0	2.500	32.100	62.200	31.000	164.600	355.793	666.400
TOTAL								
80,597	49,000	74,119	162,116	160,982	112,073	327,469	863,054	1,829,410

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE provides RDT&E funding for the B-1 Conventional Mission Upgrade Program (CMUP). The Air Force plan for B-1s will provide theater commanders with long range, large payload airpower in the early days of conflict when forward location operations are restricted, as well as support for sustained in-theater air operations in combination with other forces. The procurement cap of 20 B-2s and the reduced B-52 fleet make the B-1 the centerpiece of the bomber force. Project 4143 supports B-1 capability enhancements to improve aircraft effectiveness in conventional operations. Conventional capability improvements emphasize integrating conventional weapons, including advanced precision guided munitions.

Program Element: #0604226F **Date:** February 1994
PE Title: B-1
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Specific B-1 conventional tasks currently planned include: adding an anti-jam secure-voice radio; integrating cluster bomb units (CBUs); integrating Joint Direct Attack Munition 1 (JDAM-1), Joint Stand-Off Weapon (JSOW) integration, and Tri-Service Standoff Attack Missile (TSSAM) integration; incorporation of the MIL-STD-1760 interface for highly accurate weapons and for precision weapons; and computer memory and throughput upgrades for weapons stores management and long term reliability and maintainability improvements. This project includes the integration of GPS capability for navigation and for use with advanced weapons. Project 1019 provides for Electronic Countermeasures (ECM) improvements to the B-1. The B-1 requires ECM improvements in the areas of supportability, radar warning capability, and countermeasure effectiveness, particularly for medium to high altitude operations. Improved defensive system supportability is vital to improving B-1 reliability and maintainability, while ECM capability improvements will enhance aircraft survivability. Planned ECM activities include development of a Request For Proposal (RFP), a risk reduction activity for studies, and the evaluation of several candidate systems to support a single ECM solution in Engineering and Manufacturing Development (EMD) program. Together, projects 1019 and 4143 will allow theater commanders to take advantage of the B-1's long range and penetration capability to add mass and global reach to conventional operations worldwide. The B-1 program is categorized as a research category 6.5 (EMD) program because it is an operational weapon system with an ongoing development program which will upgrade conventional weapons and ECM capabilities.

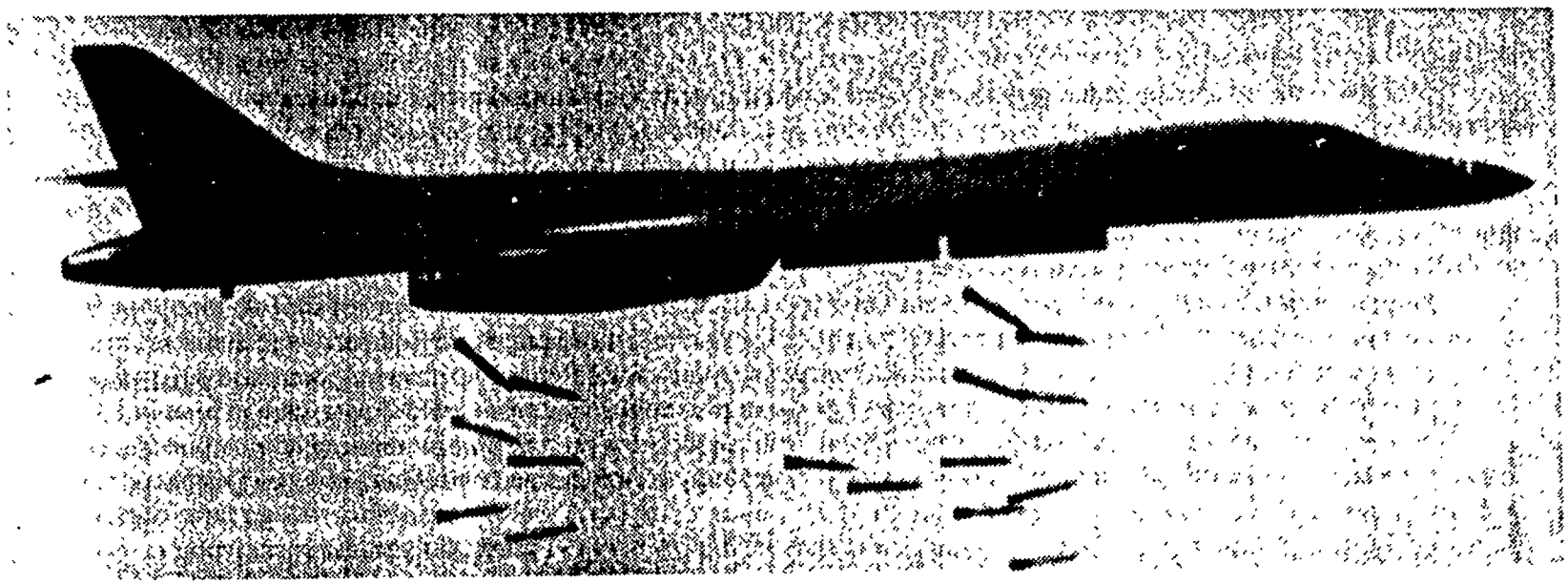
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604226F
PE Titles: B-1

Project Number: 4143
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

Project Title: B-1 Conventional Weapons Upgrade



Program Element: # 0604226F
PE Titles: B-1

Project Number: 4143
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

POPULAR NAME: B-1 Conventional Weapons Upgrade

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY1997	FY 1998	FY 1999	To Complete
Program Milestones	2Q/SSC #1 3Q/Phase I EMD start		1Q/SSC #2 (EMD go ahead GPS/Radio, JDAM/1760) 4Q/Ph I EMD complete	3Q/Phase I RAA (CBU)	2Q/St Phase II Production 4Q/Phase I FOC			Phase III Adv. Wpns EMD & Production
Engineering Milestones	4Q/Phase I PDR (CBU)	2Q/Phase I CDR (CBU)	2Q/Phase II PDR (GPS/Radio, JDAM/1760)	1Q/Phase II CDR (GPS/Radio) 3Q/Phase II CDR (JDAM/1760)			1Q/Phase II CDR (Comp)	
T&E Milestones			4Q/St Phase I CBU Flt Test	4Q/St Phase II GPS/Radio Flt Test		1Q/St Phase II JDAM/1760 Flt Test		Ph III Flt Test for Comp, Adv. Wpns
Contract Milestones	4Q/Phase II Pre-EMD		2Q/Phase II EMD 4Q/Phase I Prod					
BUDGET ($000)	FY 1993	FY 1994	FY 1995	FY 1996	FY1997	FY 1998	FY 1999	Budget Total (To Complete)
Major Contract	59,332	37,389	48,419	94,451	67,345	47,459	111,902	810,031 (343,734)
Support Contract	0	0	8,500	5,064	6,412	14,145	6,695	97,616 (56,800)
In-House Support	3,058	11,611	13,700	11,831	8,979	6,790	13,812	116,085 (46,304)
GFE/ Other	0	0	1,000	18,670	16,046	12,679	30,460	139,278 (60,423)
Total	62,390	49,000	71,619	130,016	98,782	81,073	162,869	1,163,010 (507,261)

Program Element: # 0604226F
PE Titles: B-1

Project Number: 4143
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The B-1 will deliver the lion's share of the heavy bomber fleet's conventional munitions in future conflicts. Current B-1 conventional combat capability is optimized for the delivery of 84 non-precision 500-pound gravity bombs. The Conventional Mission Upgrade Program (CMUP) will significantly increase B-1 capability, both by upgrading conventional weapons employment capability and by enhancing aircraft survivability [under project 1019, Electronic Countermeasures (ECM) improvements]. Project 4143 provides RDT&E funding for fault isolation/detection, and improved maintainability, incorporating Global Positioning System (GPS) navigation system capability, installing a secure voice radio, integrating cluster bomb units (CBUs) and performing weapons bay and launcher modifications necessary to employ the Joint Direct Attack Munition (JDAM) and other advanced conventional weapons. This project will provide the B-1 with additional weapons carriage and release growth capability, including the MIL-STD-1760 weapons interface, for use with future advanced and precision weapons such as JDAM-1, Joint Stand-Off Weapon (JSOW) and Tri-Service Standoff Attack Missile (TSSAM); and the upgrade to the avionics computer complex for weapons stores management. The Air Force selected Rockwell International to be the integrating contractor to manage B-1 Phase II and Phase III upgrade efforts under both project 4143 and project 1019. Rockwell was awarded the contract to be the prime contractor on 30 Aug 93. The conventional weapons upgrade program is divided into three contract phases:

Phase I - Unguided weapons (CBUs) integration
Phase II - Accurate weapons (JDAM-1) integration and demonstration of the benefits of adding a GPS-aided targeting system [designated as the Relative Targeting System (RTS) on B-1]
- Phase IIA - Pre-EMD (design analyses, trade studies, engineering work until PDR)
- Phase IIB - EMD (Post-PDR through flight test and kit proof)
- Phase IIC - Production (modification kits)

Phase III - Precision weapons/Mk-62 mine integration

This project is categorized as a research category 6.5 (EMD) program because it is an operational weapon system with an ongoing development program which will upgrade conventional weapons capability.

Program Element: # 0604226F
PE Titles: B-1

Project Number: 4143
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Began work on Phase I Cluster Bomb Unit (CBU) integration. ($5,119)
   - (U) Began work on Phase IIA contract. Initiated, with integrating contractor, design analysis, Engineering Manufacturing and Development (EMD) planning and preliminary design for the Joint Direct Attack Munition 1 (JDAM-1), MIL-STD-1760, Global Positioning System (GPS), radio integration, and computer upgrades. ($50,571)
   - (U) Begin upgrading instrumentation on the flight test aircraft. ($3,642)
   - (U) Mission Support/Other. ($3,058)

2. (U) FY 1994 Planned Program:
   - (U) Conduct a Relative Targeting System (RTS) demonstration. ($8,000)
   - (U) Continue Phase I activities for CBU integration through Critical Design Review (CDR) and flight test planning. ($9,553)
   - (U) Continue Phase IIA pre-EMD activities for JDAM-1, 1760, GPS, and radio. ($15,100)
   - (U) Associated simulator changes. ($3,800)
   - (U) Mission Support/Other. ($11,611)
   - (U) Continue instrumentation upgrade of the flight test aircraft. ($936)

Program Element: # 0604226F
PE Titles: B-1

Project Number: 4143
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

3. (U) FY 1995 Planned Program:
   - (U) Continue Phase I contract and flight test activities for CBUs. ($12,400)
   - (U) Continue Phase IIA contract activities for JDAM-1, 1760, GPS, and radio. ($13,200)
   - (U) Associated simulator changes. ($4,800)
   - (U) Release RFP and award contract to prime contractor for Phase IIB (EMD) of the Conventional Munition Upgrade Program (CMUP) program. ($26,500)
   - (U) Mission Support/Other. ($14,719)

4. (U) Program to Completion:
   - (U) Continue Phase II Engineering and Manufacturing Development (EMD) for Global Positioning System (GPS), Radio, JDAM, Mil-Std-1760, and Computer; Estimated Completion Date (ECD): FY 2002.
   - (U) Start and complete Phase III precision weapons EMD; ECD: FY 2002.

D. (U) Work Performed By: Rockwell International, El Segundo, CA, and The Boeing Company, Seattle, WA, are associate contractors for the Phase I efforts. Rockwell International is the prime contractor for Phase II with The Boeing Company as their major team member. Government organizations responsible for development efforts include: the B-1 System Program Office (SPO) at ASC, Wright-Patterson AFB, OH, and Tinker AFB, OK; Oklahoma City Air Logistics Center (OC-ALC), Tinker AFB, OK; Rome Laboratories, Griffiss AFB, NY; Air Force Electronic Warfare Evaluation Simulator, Dallas, TX; Warner Robins Air Logistics Center (WR-ALC), Robins AFB, GA; the Air Force Operational Test and Evaluation Center (AFOTEC), Kirtland AFB, NM; Air Force Flight Test Center, Edwards AFB, CA; JDAM/JSOW SPO, Eglin AFB, FL; and GPS Joint SPO (JSPO), Los Angeles AFB, CA.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) TECHNICAL CHANGES: The Joint Direct Attack Munition 3 (JDAM-3) integration program for the B-1 has been deleted.

Program Element: # 0604226F **Project Number: 4143** **Date: February 1994**
PE Titles: B-1 **Budget Activity: #5 Engineering and Manufacturing Development**
Old Budget Activity: #3 - Strategic Programs

2. (U) SCHEDULE CHANGES: Cluster Bomb Unit (CBU) integration remains on schedule. JDAM-1 integration is extended. The start of integration for advanced weapons has slipped one year.

3. (U) COST CHANGES: The Acquisition Program Baseline (APB) for the original B-1 Squadrons program has been closed. A new APB for the Conventional Munition Upgrade Program (CMUP) is currently being developed.

F. (U) PROGRAM DOCUMENTATION:

Previous Documents:
- (U) Strategic Air Command (SAC) Required Operational Capability (ROC) 3-66, 2 Nov 78
- (U) SAC Systems Operational Requirements Document (SORD) 003-66-I/II/III/IV-(A), 1 Oct 89, as amended
- (U) SAC MNS, 8 Jun 81
- (U) DEPSECDEF B-1 Program (Baseline MNS Dec 88)
- (U) B-1 IWSM Program Management Directive (PMD) 2248(1), 5 Dec 91, as amended 15 Mar 92, 2248(2)

Conventional Upgrade:
- (U) ACC MNS for B-1, 21 Aug 92
- (U) B-1 System Threat Assessment Report (STAR), 31 Jul 92
- (U) ACC Concept of Operations for the Conventional Use of Bombers, 1 Dec 92
- (U) ACC ORD for B-1 Conventional Upgrade Program, 22 Jan 93, CAF 357-92 (SAC 007-92)
- (U) USD(A) Decision Memorandum, 30 Apr 93
- (U) B-1 Integrated Weapon System Management (IWSM) PMD 2248(3), 8 Jul 93, as amended 2248(4) and 2248(5)
- (U) B-1 TEMP, 26 Jul 93
- (U) B-1 JDAM Weapon Integration Plan, draft

Program Element: # 0604226F
PE Titles: B-1
Project Number: 4143
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs
Date: February 1994

G. (U) RELATED ACTIVITIES
- (U) Program Element #0101126F, B-1 Squadrons
- (U) Program Element #0305164F, Global Positioning System (GPS)
- (U) Program Element #0604618F/N, Joint Direct Attack Munition (JDAM)
- (U) Program Element #0604727F/N, Joint Stand-Off Weapon (JSOW)
- (U) Program Element #0207160F, Tri-Service Standoff Attack Missile (TSSAM)
- (U) Program Element #0208006F, Air Force Mission Planning Systems (AFMSS)
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS (PROCUREMENT):

(U) Aircraft Procurement (BA 01/05/06/07): (Aircraft procurement, modifications, initial spares, readiness spares, common age)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate
3010 Aircraft Procurement						
233,854	200,755	205,043	228,856	259,575	247,278	175,409

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: (TBD)

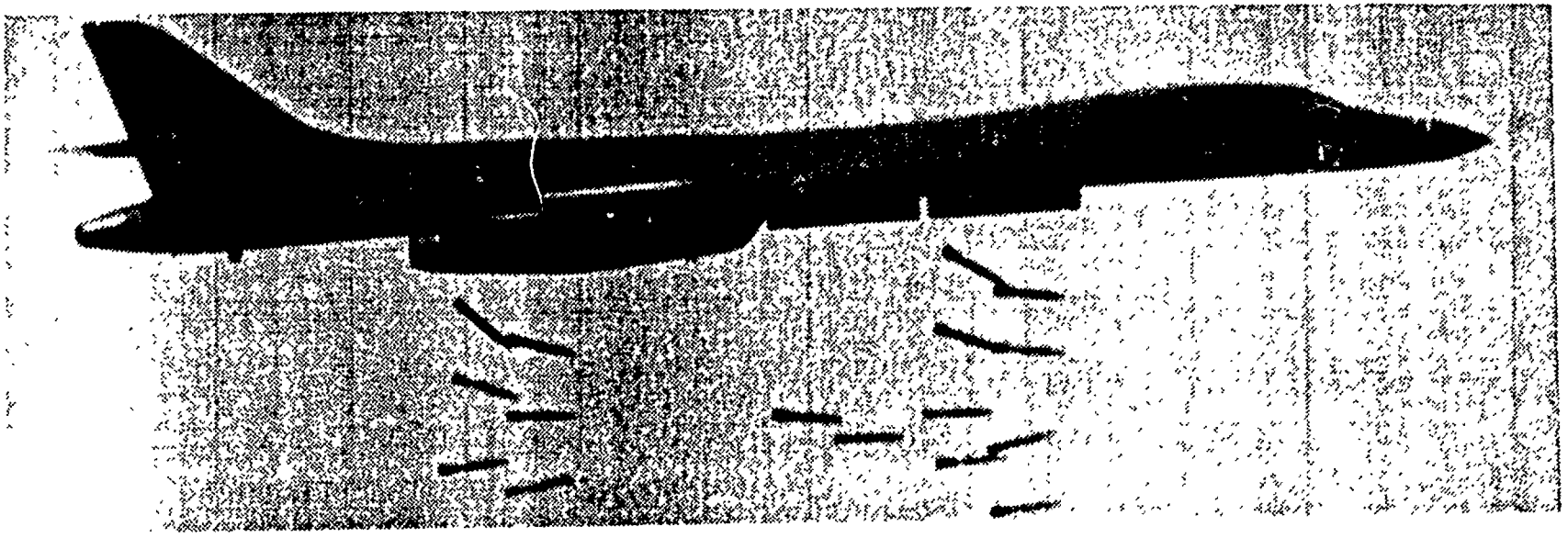
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604226F
PE Titles: B-1

Project Number: 1019
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

Project Title: B-1 Electronic Countermeasures (ECM) Improvements



Program Element: # 0604226F
PE Titles: B-1

Project Number: 1019
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

POPULAR NAME: B-1 Electronic Countermeasures (ECM) Upgrade

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY1997	FY 1998	FY 1999	To Complete
Program Milestones	2Q/SSC #1			2Q/SSC #3		1Q/Milestone II EMD start		2Q01/ Milestone III FY01 EMD complete
Engineering Milestones					1Q/SRR 3Q/SFR			
T&E Milestones				2Q/TEMP annex approved (AF lvl)	4Q/Risk Reduction Testing Complete			2Q00/Flight Test
Contract Milestones	3Q/Risk Reduction planning			3Q/Risk Reduction Implementation Phase		2Q/EMD		
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	5,963	0	2,000	18,519	52,027	20,561	69,258	262,714 (94,386)
Support Contract	10,009	0	0	500	500	500	500	13,509 (1,500)
In-House Support	1,295	0	500	6,100	7,500	8,500	11,000	178,500 (143,605)
GFE/Other	940	0	0	6,981	2,173	1,439	83,842	211,677 (116,302)
Total	18,207	0	2,500	32,100	62,200	31,000	164,600	666,400 (355,793)

Program Element: #0604226F
PE Titles: B-1

Project Number: 1019
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: B-1 Electronic Countermeasures (ECM) requirements are based on its conventional missions. The Conventional Mission Upgrade Program (CMUP) will significantly increase B-1 capability, both by upgrading conventional weapons employment capability (under project 4143 Conventional Weapon Upgrade) and by enhancing aircraft survivability. Project 1019 provides for ECM improvements needed to support the B-1's operations at medium altitudes in low to medium threat environments. This project provides for improved B-1 ECM capabilities and addresses current deficiencies in situational awareness, countermeasures, and reliability and maintainability. In FY93 the ECM project accomplished the risk reduction planning leading up to development of an RFP by the prime contractor for the selection of several risk reduction candidates. In FY94 the Air Force has stopped work on the ECM project except for completing studies underway to support the Cost and Operational Effectiveness Analysis. In FY95 these efforts will continue for the purpose of maintaining a knowledgeable work force and assessing results of ongoing ECM studies. Under this strategy, the ECM project resumes in FY96 with ECM risk reduction, modeling and simulation analyses, and lab testing of alternative defensive systems solutions, Engineering and Manufacturing Development (EMD) planning, and down selection to an EMD solution in FY98. System evaluations during risk reduction will help determine the most cost effective approach to meeting B-1 ECM requirements. The Air Force selected Rockwell International to be the integrating contractor to manage B-1 upgrade efforts under both project 4143 and project 1019. Rockwell went on contract as the prime contractor on 30 Aug 93. The B-1 program is categorized as a research category 6.5 (EMD) program because it is an operational weapon system with an ongoing development program which will upgrade conventional weapons capability and ECM capability.

Program Element: # 0604226F
PE Titles: B-1

Project Number: 1019
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Awarded contract to integrating contractor for risk reduction planning - 30 Aug 93. ($5,963)
   - (U) Began Congressionally mandated and other studies. ($5,259)
   - (U) Began Cost and Operational Effectiveness Analysis (COEA) study with Institute for Defense Analyses. ($4,750)
   - (U) Mission Support/Other. ($2,235)

2. (U) FY 1994 Planned Program:
   - (U) No activity per Congressional direction.

3. (U) FY 1995 Planned Program:
   - (U) Maintain knowledgeable work force and initiate activities to prepare for FY96 Risk Reduction. ($2,000)
   - (U) Mission Support/Other. ($500)

4. (U) Program to Completion:
   - (U) Selection of candidate systems by prime contractor and conduct a 20 to 21-month risk reduction effort; Estimated Completion Date (ECD): 1Q FY 1998.
   - (U) Engineering Manufacturing and Development (EMD) through flight test; ECD: FY 2001.
   - (U) Production (modification kits and installation); ECD: FY 2006.

Program Element: #0604226F
PE Titles: B-1

Project Number: 1019
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

D. (U) WORK PERFORMED BY: Rockwell International, El Segundo, CA, is the prime integrating contractor with The Boeing Company, Seattle, WA, as the major subcontractor team member. Subcontractors for the Electronic Countermeasures (ECM) upgrade will not be determined until the ECM project is resumed in FY96. Government organizations responsible for various development efforts include: the B-1 System Program Office (SPO) at ASC, Wright-Patterson AFB, OH; Oklahoma City Air Logistics Center (OC-ALC), Tinker AFB, OK; Rome Laboratories, Griffiss AFB, NY; Air Force Electronic Warfare Evaluation Simulator, Dallas, TX; Warner Robins Air Logistics Center (WR-ALC), Robins AFB, GA; the Air Force Operational Test and Evaluation Center (AFOTEC), Kirtland AFB, NM; Air Force Flight Test Center, Edwards AFB, CA; and Air Force Developmental Test Center (AFDTC), Eglin AFB, FL.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) TECHNICAL CHANGES: No change in ECM program strategy described in FY93.

2. (U) SCHEDULE CHANGES: The start of risk reduction and the down selection for EMD have slipped from FY94 to FY96 due to funding cuts.

3. (U) COST CHANGES: Based on 1994 Congressional direction concerning ECM, ECM development efforts have been delayed and prior year funds ($31.0M of FY93 and $7.2M of FY94) have been reallocated from the ECM project to the conventional weapon upgrade project. In addition, approximately $100M has been moved from 3010 to 3600 and accelerated two years to start in FY98 to implement the Integrated Logistics Support process.

Program Element: # 0604226F
PE Titles: B-1

Project Number: 1019
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

F. (U) PROGRAM DOCUMENTATION:

Previous Documents:

- (U) Strategic Air Command (SAC) Required Operational Capability (ROC) 3-66, 2 Nov 78
- (U) SAC System Operational Requirements Document (SORD) 003-66 I/II/III/IV-(A), 1 Oct 89, with amendments
- (U) SAC MNS, 8 Jun 81
- (U) DEPSECDEF B-1 Program (Baseline MNS Dec 88)
- (U) B-1 IWSM Program Management Directive (PMD) 2248(1), 5 Dec 91, as amended 15 Mar 92, 2248(2)
- (U) SAC MNS 6-91, B-1 End-to-End Tester, as amended 20 Feb 92

Conventional Upgrade:

- (U) ACC MNS for B-1, 21 Aug 92
- (U) B-1 System Threat Assessment Report (STAR), 27 Jul 92
- (U) ACC Concept of Operations for the Conventional Use of Bombers, 1 Dec 92
- (U) ACC ORD for B-1 Conventional Upgrade Program, 22 Jan 93, CAF 357,92 (SAC 007-92)
- (U) USD(A) Decision Memorandum, 30 Apr 93
- (U) B-1 Integrated Weapon System Management (IWSM) PMD 2248(3), 8 Jul 93, as amended 2248(4) and 2248(5)
- (U) B-1 TEMP, 26 Jul 93

Program Element: # 0604226F
PE Titles: B-1

Project Number: 1019
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #3 - Strategic Programs

Date: February 1994

G. (U) RELATED ACTIVITIES:

- (U) Program Element #0101126F, B-1 Squadrons
- (U) Program Element #0604270F, Electronic Warfare (EW) Development
  - (U) Project #3896, Advanced Strategic Tactical Expendable (ASTE)
- (U) Program Element #0305164F, Navstar Global Positioning System (GPS)
- (U) Program Element #0604618F/N, Joint Direct Attack Munition (JDAM)
- (U) Program Element #0604727F/N, Joint Stand-Off Weapon (JSOW)
- (U) Program Element #0207160F, Tri-Service Stand-Off Attack Missile (TSSAM)
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

(U) Aircraft Procurement (BA 01/05/06/07): (Aircraft procurement, modifications, initial spares, readiness spares, common age)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate
3010 Aircraft Procurement						
233,854	200,755	205,043	228,856	259,575	247,278	175,409

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2325 Simulator Development Activities								
1,862	3,000	3,935	3,795	3,559	3,685	3,823	Cont	TBD
2769 Simulator Update Development/Simulator Requirements Definition								
6,843	3,406	3,635	3,223	3,152	3,291	3,447	Cont	TBD
2851 Standard DOD Simulator Data Base/Common Transformation Program								
2,100	1,900	0	0	0	0	0	0	28,366
2901 B-1B Weapon Systems Trainer								
630	0	0	0	0	0	0	0	128,980
2968 Modular Simulator Design								
392	0	0	0	0	0	0	0	10,536
3000 KC-135 Aircrew Training System								
0	50	1,438	1,441	0	0	0	0	2,929

Program Element: #0604227F
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

Date: February 1994

3135 Advanced Training System (ATS)								
3,042	1,898	1,438	1,035	1,011	1,059	1,112	Cont	TBD
3282 C-17 Aircrew Training System								
86	25	0	0	0	0	0	0	73,793
3772 C-141 Aircrew Training System								
3,875	2,370	0	0	0	0	0	0	33,330
3775 Manpower, Personnel, and Training								
6	0	0	0	0	0	0	0	1,370
4022 Simulator for Electronic Combat Training (SECT)								
8,282	7,150	3,623	95	0	0	0	0	25,820
4156 AFSPC Training Development								
0	16	192	480	283	296	307	Cont	TBD
4157 USAFA Computer Education/Training Development								
0	0	0	0	0	0	0	0	0
Total								
27,118	19,815	14,261	10,069	8,005	8,331	8,689	Cont	TBD

Note: Project 4033 - JPATS Ground Based Training System (GBTS) funds for FY95-99 transferred to PE 64233F, Specialized Undergraduate Pilot Training (SUPT).

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

B. (U) BRIEF DESCRIPTION OF ELEMENT: This is a continuing program element for development of aircrew and maintenance training techniques and devices. This program element is devoted to the Engineering and Manufacturing Development (EMD) of aircrew and maintenance training systems and is therefore included in budget activity #5 (EMD). Objectives are to adapt simulation technology and standards developed in the laboratories and industry to satisfy MAJCOM training requirements, and to develop prototype training devices. The AFSPC program is the only new program start in FY94. Initial funding for the KC-135 Aircrew Training System upgrades began in FY92 within project 2769, and it transitions to its own project in FY94. Development funds for the Joint Primary Aircraft Training System (JPATS) Ground Based Training System (GBTS) were transferred to the host aircraft program element (PE 64233F) to comply with the Air Force's Integrated Weapon System Management (IWSM) process.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 2325 - Simulator Development Activities: Provides the funds to conduct engineering development of new aircrew/maintenance training technologies and standards. Funds the pre-production of first article training devices to satisfy the customer's training requirements. Efforts currently planned or underway include using artificial intelligence techniques in the development of a generic Intelligent Training Management System (TMS). Structural Modeling, a set of software templates and corresponding specification forms for developing training device software, will also be developed.

(U) FY 1993 Accomplishments:
(U) - Further refined the Structural Modeling Handbook which aids the implementation of the Ada software language in simulator development. ($1.0M) (Jan 94)
(U) - Successfully demonstrated the Intelligent TMS scheduling engine at Reese AFB TX. ($.862M) (Jun 93)

(U) FY 1994 Plans:
(U) - Structural Modeling (SM) will continue support of Special Operations Forces Aircrew Training System, Simulator for Electronic Combat Training, and F-22 programs. Development of a SM test bed and core architecture is planned. ($1.9M) (Dec 94)
(U) - The Intelligent (TMS) will expand the scheduling engine into a complete scheduling module. It will be integrated into and tested with an existing TMS. ($.7M) (Feb 94)

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) - Begin testing to determine the acuity of peripheral vision under dynamic conditions. ($.2M) (Dec 94)
(U) - Determine tradeoffs between Area of Interest (AOI) size and resolutions, blend region, and latency requirements of visual systems using the Espirit visual system. ($.2M) (Dec 94)

(U) FY 1995 Plans:
(U) - Complete Phase III of the Intelligent Training Management System (TMS) consisting of the development of a generic TMS shell. ($1.1M) (Sep 95)
(U) - Continue development of the Structural Modeling (SM) core architecture. Continue support of programs using SM. ($.835M)
(U) - Continue development of objective measures for the transfer of training from the simulator to the aircraft. ($1.0M)
(U) - Continue evaluation, integration, and documentation of latest training technologies (SMART 2000). ($1.0M)

(U) Program to Completion:
(U) - Continue development of objective measures for the transfer of training from the simulator to the aircraft. ($1.4M)
(U) - Continue evaluation, integration, and documentation of the latest training technologies (SMART 2000). ($1.5M)
(U) - Begin development of a prototype training system for demonstrating latest training system technology. ($.895M)

(U) Work Performed By: The Training System Program Office, Aeronautical Systems Center, Wright-Patterson AFB OH; Software Engineering Institute (SEI), Pittsburgh PA; and Intelligent Systems Application Center (ISAC), Dayton OH.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

2. (U) Project 2769 - Simulator Update Development/Simulator Requirements Definition: Develops updates to training systems to maintain and improve their supportability and effectiveness. Initiatives are identified and funded through this project to modify and upgrade existing training systems. Project 2769 funds initial and continuing development activities such as development of C-130H maintenance training devices and Undergraduate Air Weapons Controller Training (UCT). Project 2769 is also used to: a) define requirements for new training systems in the form of tasks to be trained (this supports a Milestone 0 decision); b) develop options to meet the requirements (this supports a Milestone 1 decision); and c) build a prototype of one or more of the options to evaluate the training effectiveness of those options.

(U) FY 1993 Accomplishments:
(U) - Continued KC-135 Aircrew Training System development activities (see Project 3000 for description). ($3.0M) (Sep 93)
(U) - Began R&D activities associated with Interactive Multi Media modules on the History of Air Power (USAFA). ($.5M) (Sep 93)
(U) - Continued analysis of AFSPC training requirements. ($1.0M). (Sep 93)
(U) - Completed UCT contract award and prototype development. ($2.343M) (Sep 93)

(U) FY 1994 Plans:
(U) - Application of aircrew training concepts to Air Combat Command aircraft. ($1.9M)
(U) - Begin implementing DOD Instruction 1322.20 across the Training Systems Division. ($.5M)
(U) - Begin developing updates for C-130 maintenance training devices. ($1.0M)

(U) FY 1995 Plans:
(U) - Begin examination of Distributed Interactive Simulation (DIS) retrofits to Air Force simulators. ($3.635M)

(U) Program to Completion:
(U) - Continue examination of DIS retrofits to Air Force simulators. ($2.1M)

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) Work Performed By: The Training System Program Office (SPO), Aeronautical Systems Center, Wright-Patterson AFB OH; The Theater Command and Control SPO, Electronic Systems Center, Hanscom AFB MA; USAFA, Colorado Springs CO; and HQ AFSPC, Peterson AFB CO. Prime contractors are CAE-Link, Dallas TX; JWK, Annandale VA; ECC Corporation, Wayne PA; and SwRI, San Antonio TX.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2851 - Standard DOD Simulator Data Base/Common Transformation Program: Develops a standard DOD digital data base library, distribution function exchange standards, and a data base enhancement and generation capability. This minimizes simulator database development redundancy within and among the services, and will maximize database utility and interoperability.

(U) FY 1993 Accomplishments: ($2.100M Total)
(U) - Demonstrated Standard Interchange Format (SIF) capability of data base interoperability between aircrew training systems. (Not separately priced (NSP)) (Sep 93)
(U) - Demonstrated SIF capability of distributed interactive simulation at the 1993 Interservice/Industry Training Systems and Education Conference. (NSP) (Sep 93)
(U) - Began pre-production support effort. ($1.1M)
(U) - Began upgrade of system software & hardware suite preparation for operational status. ($1.0M)

(U) FY 1994 Plans:
(U) - Move system hardware to Kirtland AFB, NM. ($.2M) (Sep 94)
(U) - Limitation of Government Liability (Logo). ($1.7M) (Sep 94)

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) FY 1995 Plans:
(U) - Operational. ($0M)

(U) Program to Completion: Not Applicable.

(U) Work Performed By: The Training System Program Office, Aeronautical Systems Center, Wright-Patterson AFB OH. Contractor is PRC, Inc., McLean VA.

(U) Related Activities:
(U) - Project 2851 is a joint service project conducted under the Joint Logistic Commanders (JLC) through the Joint Technical Coordinating Group for Training Systems and Devices.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 2901 - B-1B Weapon System Trainer: Develops aircrew training devices for all B-1B crew members to include mission rehearsal, takeoff and landing, navigation, air refueling, threat analysis/countermeasures, low-level penetration, weapons delivery, and emergency procedures.

(U) FY 1993 Accomplishments:
(U) - Completed System Development. ($.630M) (Sep 93)

(U) FY 1994 Plans: Not Applicable.

(U) FY 1995 Plans: Not Applicable.

(U) Program to Completion: Not Applicable.

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) Work Performed By: The Training System Program Office, Aeronautical Systems Center, Wright-Patterson AFB OH; Boeing Military Co., Huntsville AL.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 07, Program Title Common Support Equipment								
856	0	0	0	0	0	0	0	178,126

(U) International Cooperative Agreements: Not Applicable.

5. (U) Project 2968 - Modular Simulator Design: Develop a MIL-STD for flight simulator software modules to allow reuse of software from one simulator to the next and simplify the job of updating module software to maintain simulator currency with aircraft.

(U) FY 1993 Accomplishments: ($.392M Total)
(U) - Completed concept demonstration and validation. ($.392M) (Sep 93)
(U) - Analyzed interoperability with simulator networks. (Not separately priced (NSP)) (Sep 93)
(U) - Analyzed advanced avionics compatibility for modular simulation. (NSP) (Sep 93)

(U) FY 1994 Plans: Not Applicable.

(U) FY 1995 Plans: Not Applicable.

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) Program to Completion: Not Applicable.

(U) Work Performed By: The Training System Program Office, Aeronautical Systems Center, Wright-Patterson AFB OH. Prime contractor is Boeing Military Airplane Co., Huntsville AL.

(U) Related Activities:
(U) - Project 2968 is a joint service project conducted under the Joint Logistic Commanders (JLC) through the Joint Technical Coordinating Group for Training Systems and Devices.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

6. (U) Project 3000 - KC-135 Aircrew Training System: Develops aircrew training devices and courseware for KC-135E, KC-135R, and C-135B aircrew members including Air National Guard (ANG) and Air Force Reserve (AFRES) components to satisfy continuation training requirements. Replaces current "blue-suit" instructors with contractor instructors.

(U) FY 1993 Accomplishments:
(U) - Deployed 80% of ANG/AFRES Computer Based Training (CBT) courseware and 100% of hardware. (See Project 2769) (Sep 93)
(U) - Completed 3 of 4 trade studies. (See Project 2769) (Sep 93)
(U) - Completed ramp-up of the Aircrew Training System. (See Project 2769) (Sep 93)

(U) FY 1994 Plans:
(U) - Mission Support. ($.05M)

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) FY 1995 Plans: ($1.438M Total)
(U) - Complete development of additional Computer Based Training (CBT) courses and deployment. (Not separately priced (NSP)) (Sep 95)
(U) - Develop engineering change for ground collision avoidance system (GCAS) concurrent with similar change on aircraft. ($1.4M) (Sep 95)

(U) Program to Completion: ($1.441M Total)
(U) - Develop replacement for KC-135 Weapon System Trainer (WST) navigation prototype station due to KC-135 WST elimination. (NSP)
(U) - Develop replacement for KC-135 Boom Operator Part Task Trainer prototype. (NSP)
(U) - Complete development of GCAS. (NSP)

(U) Work Performed By: The Training Systems Product Group, Aeronautical Systems Center, Wright-Patterson AFB OH, and Ogden Air Logistics Center, Hill AFB UT.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 07, Program Title Common Support Equipment								
0	7,000	10,600	16,600	1,800	0	0	0	36,000

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

7. (U) Project 3135 - Advanced Training System (ATS): ATS supports instructional development, delivery, evaluation, and resource management at Air Education and Training Command's Technical Training Centers. Its main goals are to free instructors for individualized instruction in complex, highly technical tasks; promote efficient training; and provide rapid course creation and updating. Commercial hardware and software will yield a reliable and easily maintainable system.

(U) FY 1993 Accomplishments: ($3.042M Total)
(U) - Completed Software Critical Design Reviews. (Not separately priced (NSP)) (Mar 93)
(U) - Draft Production Plan prepared. (NSP) (Jul 93)
(U) - Began Low Rate Initial Production. (NSP) (Sep 93)

(U) FY 1994 Plans: ($1.898M Total)
(U) - Completed Development Test and Evaluation. (NSP) (Nov 93)
(U) - Begin course conversions. (NSP) (Nov 93)
(U) - Installed Operational Test and Evaluation Suite at Keesler AFB MS. (NSP) (Dec 93)

(U) FY 1995 Plans: ($1.438M Total)
(U) - Complete installation at Keesler AFB MS. (NSP) (Dec 94)
(U) - Complete first production installation at Randolph AFB TX. (NSP) (Dec 94)
(U) - Begin installation at Sheppard AFB TX. (NSP) (May 95)

(U) Program to Completion:
(U) - Complete installation at Sheppard AFB TX. (NSP) (May 96)
(U) - Begin installation at Lackland AFB TX. (NSP) (Jan 97)

(U) Work Performed By: Advanced Training System Branch, Human Systems Program Office, Human Systems Center, Brooks AFB TX. Contractor is Loral Federal Systems Company, Manassas VA.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

8. (U) Project 3282 - C-17 Aircrew Training System: Provides initial and continuation training for C-17 aircrew members. Training will be totally contractor administered and supported, with Air Mobility Command (AMC) evaluating the final product - a fully qualified aircrew member. The training system will be developed concurrently with aircraft development and production efforts.

(U) FY 1993 Accomplishments:
(U) - Mission support. ($.086M)

(U) FY 1994 Plans:
(U) - Mission support. ($.025M)

(U) FY 1995 Plans: Not Applicable.

(U) Program to Completion: Not Applicable.

(U) Work Performed By: Training System Program Office, Aeronautical Systems Center, Wright-Patterson AFB OH. Contractor is McDonnell Douglas Training Systems Inc., Bedford TX.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0604227F
Date: February 1994
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 07, Program Title Common Support Equipment								
12,370	30,310	87,000	0	0	0	0	0	257,522

(U) International Cooperative Agreements: Not Applicable.

9. (U) Project 3772 - C-141 Aircrew Training System (ATS): The C-141 ATS program develops and deploys a training system for C-141 active duty and reserve forces aircrew members, as well as maintenance engine run technicians. It will also include the Basic Flight Engineer Course for all DOD and Allied flight engineers. The program provides maintenance and logistic support of all ATS associated training equipment, a training management system to track student progress and update the training programs, and contractor instructor support of the new C-141 ATS following delivery to the sites.

(U) FY 1993 Accomplishments:
(U) - Second upgraded (development funded) Weapons System Trainer (WST) fielded at Altus AFB OK. This simulator is equipped with a new ESIG 200 dusk/night visual system, 6 degrees of freedom (DOF) motion, and modified simulator software to include new aerodynamic data from flight test program. Final Acceptance at Site Training Readiness Review in FY 95. ($.7M) (Sep 93)
(U) - Continued Aircrew Training System (ATS) courseware development. Change Order issued to incorporate revised courseware development baseline via ECP 93-0019. Courseware delivery schedule extended to 4Q FY 94. ($3.175M)

Program Element: #0604227F **Date:** February 1994
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) FY 1994 Plans: ($2.370M Total)
(U) - Finalize the Undefinitized Contractual Action for revised course development baseline. ($2.370M) (Sep 94)
(U) - Continue courseware development. Final Courseware Readiness Review now scheduled for 4Q FY 94. (Not separately priced (NSP))
(U) - Training Management System and Training System Support Center to be fielded in 2Q FY 94. (Finai acceptance at Site Training Readiness Review (STRR) in FY95). (NSP)

(U) FY 1995 Plans: Not Applicable.

(U) Program to Completion: Not Applicable.

(U) Work Performed By: Aeronautical Systems Center's Training System Program Office, Wright-Patterson AFB OH manages this effort. The prime contractor for this program is Hughes Training Inc., Arlington TX.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense. There is a parallel production program included in this contract to deliver additional upgraded weapons system trainers to the other C-141 main operating bases.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 07, Program Title Common Support Equipment								
9,346	16,875	5,146	0	0	0	0	0	43,482

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #5 - Defense-Wide Mission Support

10. (U) Project 3775 - Integrated Manpower, Personnel, Training, and Safety: Funding is used to pursue initiatives which integrate Manpower, Personnel, Training, and Safety (MPTS) considerations into the weapon systems acquisition process. Personnel trained in these specialties are responsible for the development of critical acquisition data, including the Manpower Estimate Report, a DOD-directed requirement to OSD and Congress.

(U) FY 1993 Accomplishments:
(U) - Mission-reduction support. ($.006M) (Sep 93)

(U) FY 1994 Plans: Not Applicable.

(U) FY 1995 Plans: Not Applicable.

(U) Program to Completion: Not Applicable.

(U) Work Performed By: Deputy for Acquisition Logistics, Wright-Patterson AFB OH. Contractors are Hay System Inc., Washington DC, and Automation Research Systems Ltd., Alexandria VA.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

11. (U) Project 4022 - Simulator for Electronic Combat Training (SECT): The SECT will replace outdated simulation devices that support Electronic Warfare Officer Training. The simulator will train students in basic threat recognition and associated electronic combat procedures in a simulated airborne environment. This training is possible only with simulation due to environment, security and range restrictions. This is a one-of-a-kind system with no scheduled production effort.

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) FY 1993 Accomplishments:
(U) - Completed Preliminary Design Review (PDR). ($3.4M) (Oct 93)
(U) - Initiated Critical Design Review (CDR) Readiness Assessment. ($4.882M) (Oct 93)

(U) FY 1994 Plans: ($7.150M Total)
(U) - Complete CDR Readiness Assessment. ($1.15M) (Dec 94)
(U) - Complete CDR. ($4.0M) (Feb 94)
(U) - Complete system design and begin hardware/software development/integration. (Not separately priced (NSP)) (Apr 94)
(U) - Complete Computer Based Training (CBT) for Electronic Warfare Officer School. ($2.0M) (Jun 94)

(U) FY 1995 Plans:
(U) - Begin in-plant test of system. ($.623M)
(U) - Begin integration of Navy Electronic Warfare training into baseline system. ($2.0M)
(U) - Deploy and complete on-site test of system at Randolph AFB TX. ($.7M) (Feb 95)
(U) - Initiate Air Education and Training Command (AETC) CBT Development. ($.3M)

(U) Program to Completion:
(U) - Complete integration of Navy Electronic Warfare training into baseline system. (NSP) (Sep 96)
(U) - Complete AETC CBT Development. ($.095M) (Sep 96)

(U) Work Performed By: The Training System Program Office, Aeronautical Systems Center, Wright-Patterson AFB OH manages this effort. Prime contractor is AAI Corp., Hunt Valley MD.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0604227F **Date: February 1994**
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

12. (U) Project 4156 - AFSPC Training Development: This project consists of studies, up to and including Training System Requirements Analyses, TSRA, to determine AFSPC requirements for training systems and/or devices. The training systems and devices span all areas of AFSPC missions, including launch base operations, satellite command and control, surveillance, and early warning.

(U) FY 1993 Accomplishments:
(U) - Completed Training System Requirements Analysis for Launch Base Operations. (See Project 2769) (Sep 93)

(U) FY 1994 Plans:
(U) - Provide training to AFSPC users of Launch Based Operations database. ($.016M)

(U) FY 1995 Plans:
(U) - Perform initial phase of Training System Requirements Analysis for AFSPC programs including MILSTAR, based on supplementary funding required from AFSPC to complete a TSRA. ($.192M)

(U) Program to Completion:
(U) - Implement training system acquisition for AFSPC; transition training system expertise and methodology to AFSPC. ($.4M)
(U) - Perform initial phase of TSRA for NAVSTAR GPS based on supplementary funding required from AFSPC to complete a TSRA. (Not separately priced (NSP))

(U) Work Performed By: The Training System Program Office, Aeronautical Systems Center, Wright-Patterson AFB OH, manages this effort.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0604227F
Date: February 1994
PE Title: Training Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #6 - Defense-Wide Mission Support

13. (U) Project 4157 - USAFA Computer Education/Training Development: This project directs the development efforts for the integration of advanced educational technology to the curriculum of the Air Force Academy. Projected technology spin-offs will impact emerging maintenance training device requirements. Specific efforts include a Training Requirements Assessment, Educational Innovation Program, Network Classroom Systems, and the development of a proof of concept, Interactive Multi-Media series on the History of Air Power.

(U) FY 1993 Accomplishments:
(U) - Began development on Advanced Educational Training Systems. (See Project 2769) (Sep 93)
(U) - Completed USAFA Needs Assessment Phase I. (See Project 2769) (Sep 93)
(U) - Began development of USAFA prototype module for Air Power Series. (See Project 2769) (Sep 93)
(U) - Began curriculum development process for USAFA core course. (See Project 2769) (Sep 93)

(U) FY 1994 Plans: Not Applicable. Congressional language denied further funding for this project in FY 94 Appropriations Committee.

(U) FY 1995 Plans: Not Applicable.

(U) Program to Completion: Not Applicable.

(U) Work Performed By: The Training System Program Office, Wright-Patterson AFB OH, and the USAFA, Colorado Springs CO, manage this effort. Prime contractor is Southwest Research Institute (SwRI), San Antonio TX and JWK International, Annandale VA.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

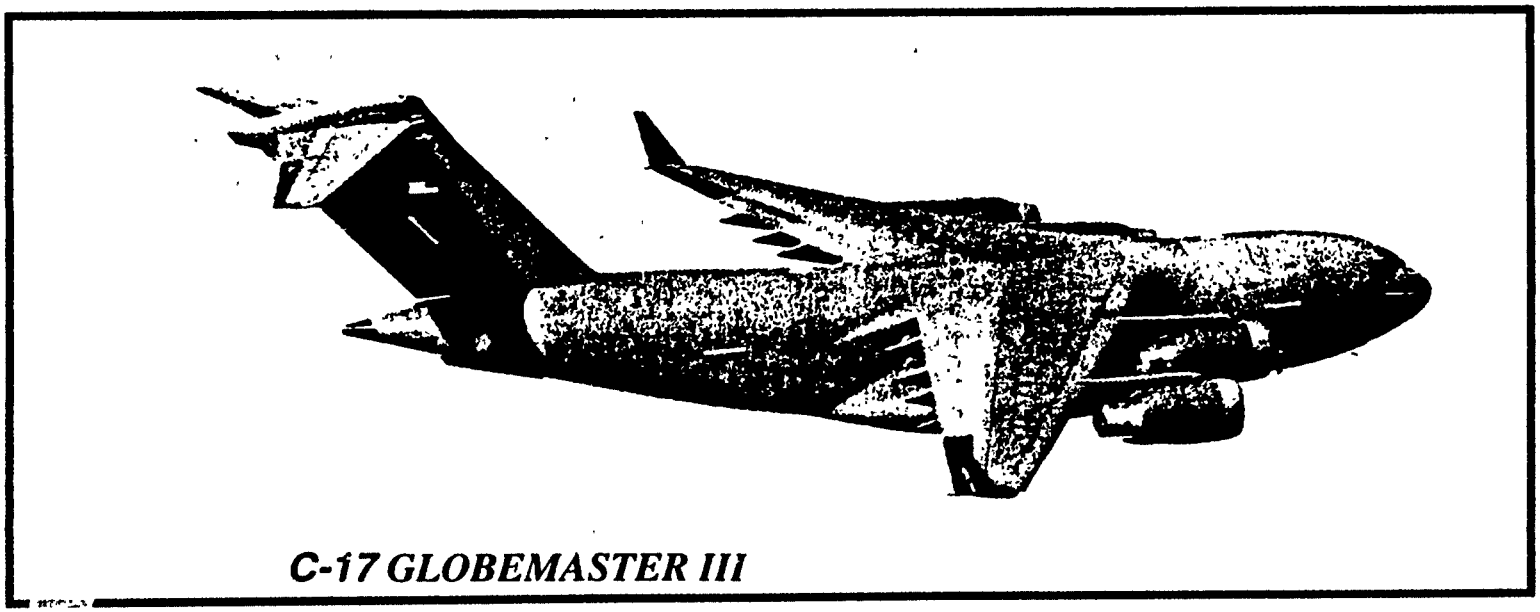
Program Element: #0604231F
PE Title: C-17 Program

Project Number: 2569
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs

Date: February, 1994

Project Title: C-17

Note: The FY 1995 C-17 budget request is based on the assumption that the January 6, 1994 agreement between USD(A&T) and McDonnell Douglas Corporation will be implemented, requiring specific congressional approval and appropriation.



C-17 GLOBEMASTER III

Program Element: #0604231F
PE Title: C-17 Program

Project Number: 2569
Budget Activity: #5-Engineering and Manufacturing Developmer
Old Budget Activity: #4-Tactical Programs
POPULAR NAME: C-17

Date: February, 1994

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones			IOC Jan 95 RM&A Jul 95	IIIB Nov 95				
Engineering Milestones								
T&E Milestones			DT&E 1Q FY95 DIOT&E 2Q FY95					
Contract Milestones	Lot IV (4a/c) 28 May 93	Lot V (6 a/c) 29 Oct 93	Lot VI (6a/c) Feb 94					
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	102,100	49,200	4,100	0	0	0	0	155,400 (0)
Support Contract	5,700	6,600	6,600	6,600	3,520	3,520	3,520	36,060 (0)
In-House Contract	7,800	8,800	13,500	10,700	12,180	10,580	7,680	71,240 (0)
GFE/Other	53,042	167,897	197,254	19,825	6,234	5,229	2,995	452,409 (0)
Total	168,642	232,497	221,454	37,125	21,934	19,329	14,195	715,109 (0)

Program Element: #0604231F
PE Title: C-17 Program
Project Number: 2569
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs
Date: February, 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES:
Airlift is vital to meet US mobility requirements and allows the flexibility to tailor a response to contingencies anywhere in the world. Additional airlift capability is needed for rapid deployment of combat forces to support national objectives and for timely movement to meet forward area mobility requirements. The congressionally mandated Mobility Requirements Study (MRS), Volume I, forwarded to Congress on 23 Jan 92, once again validated the need for the C-17 aircraft. Specific tasks associated with the airlift mission area include deployment, employment (airland, airdrop, and extraction), sustaining support, retrograde, and combat redeployment. The C-17 will be capable of performing the entire spectrum of airlift missions and is specifically designed to operate effectively and efficiently in both the strategic and theater environments. Therefore, its increased overall airlift capability will replace the capabilities lost from retiring aging C-141 aircraft which began in FY93. The C-17 will be capable of performing the airlift mission well into the 21st century. This program element is budgeted in Budget Activity 5 (EMD, research category 6.5) because the program has completed Milestone II, is currently engaged in final stages of engineering development and flight test, and is in low rate production.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS: ($ in Thousands)

1. (U) FY 1993 Program:
   (U) - Continued flight test program (T-1, P-1, P-2, P-3, P-4, P-5). ($34,700)
   (U) - Continued developmental testing. ($39,400)
   (U) - Began Live Fire Test (LFT) program. ($2,400)
   (U) - Continued developmental effort. ($92,142)

2. (U) FY 1994 Planned Program:
   (U) - Continue flight test program. ($52,800)
   (U) - Continue LFT program. ($43,300)
   (U) - Continue developmental effort. ($82,688)
   (U) - Implement USD(A&T) and McDonnell Douglas Corp. (MDC) settlement. ($53,700)

3. (U) FY 1995 Planned Program:
   (U) - Complete LFT program; estimated completion date (ECD): to be determined. ($1,600)
   (U) - Complete developmental test & evaluation testing; ECD: 1Q/FY95. ($10,200)

Program Element: #0604231F
PE Title: C-17 Program
Project Number: 2569
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs
Date: February, 1994

(U) - Complete reliability maintainability & availability (RM&A) evaluation; estimated completion date (ECD): 4Q FY95. ($12,000)
(U) - Continue flight test program. ($15,900)
(U) - Continue developmental effort. ($65,454)
(U) - Implement USD(A&T) and MDC settlement. ($116,300)

4. (U) Program to Completion:
(U) - Complete developmental effort; ECD: TBD. ($92,500)

D. (U) WORK PERFORMED BY:
McDonnell Douglas Aerospace, Long Beach, California; Wright Lab, Wright-Patterson AFB, Ohio

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The current estimates for the aircraft payload/range and the landing and takeoff distances have been adjusted to account for the projected operating weight, drag, and engine performance. The Operational Requirements Document (ORD) threshold is now defined as the Heavy Logistics Mission (110,000 lbs at 3200 NM).

2. (U) SCHEDULE CHANGES: The Milestone IIIB decision has been rescheduled from Jul 95 to Nov 95. Initial Operational Capability (IOC) could be delayed up to 6 months to Jul 95 (Threshold IOC).

3. (U) COST CHANGES: Increases in FY94 funding and the FY95 request are due primarily to the proposed settlement. The increase in FY96 is due to projected inflation.

F. (U) PROGRAM DOCUMENTATION:
(U) - Statement of Operational Need (SON) Mission Element Need Statement (MENS), Nov 80.
(U) - Decision Coordinating Paper (DCP), Jun 88.

Program Element: #0604231F
PE Title: C-17 Program
Project Number: 2569
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs
Date: February, 1994

(U) - Acquisition Decision Memorandum (ADM), 6 Nov 89.
(U) - Acquisition Program Baseline (APB), 20 Feb 92.
(U) - ADM, 2 Apr 92.
(U) - ORD, 7 Sep 93.
(U) - Test & Evaluation Master Plan (TEMP), approved 4 Oct 88; Change 6, 6 May 93.
(U) - Program Management Directive (PMD), 30 Sep 93.

G. (U) RELATED ACTIVITIES: None.
There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Information below is based on the purchase of 40 aircraft through FY96 and contingent on the USD(A&T)/MDC settlement agreement (requiring congressional approval). DoD is currently committed to a 40 aircraft C-17 buy and approval of additional C-17s is dependent on final decisions at Milestone IIIB (Nov 95).

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	To Complete	Total Program
Appropriation APAF, Budget Activity #2, Program Title C-17 Program					
2,065,389	2,186,617	2,765,912	2,639,800		15,384,000
(6)	(6)	(6)	(8)	(0)	(40)
Appropriation Military Construction, Budget Activity N/A, Program Title C-17 Program					
31,100	15,200	0	28,100	(0)	254,600
Appropriation APAF, Budget Activity #5-Mods, Program Title C-17 Program					
0	2,100	6,108	(0)	(0)	8,208

Program Element: #0604231F
PE Title: C-17 Program
Project Number: 2569
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs
Date: February, 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Landing Gear Drop Tests	Jul 90-Feb 91	Satisfactory
Propulsion System Qualification Tests	Aug 90-May 91	Satisfactory
T-1 Avionics System Level Tests	Sep 90-Sep 91	Satisfactory
Fuel System Simulator Qualification Tests (Phase A)	Dec 90-Apr 91	Completed
P-1 Airload Calibration Test	Jun 91-Aug 91	Completed
T-1 1st Flight/Flight Test Start	15 Sep 91	Satisfactory/Ongoing
Initiate DT&E	15 Sep 91	Satisfactory/Ongoing
Static Aircraft Testing Start	Oct 91	Ongoing
P-1 Enters Flight Test/1st Flight	18 May 92	Satisfactory/Ongoing
P-2 Enters Flight Test/1st Flight	21 Jun 92	Satisfactory/Ongoing
P-3 Enters Flight Test/1st Flight	7 Sep 92	Satisfactory/Ongoing
Static Article Wing Failure	1 Oct 92	Corrective action completed
P-4 1st Flight/Enters Flight Test	9 Dec 92/20 Jan 93	Satisfactory/Ongoing
P-5 1st Flight/Acceptance Testing	31 Jan 93	Satisfactory
P-5 Delivery to AF/EMR/Lightning Testing	12 Mar 93	Satisfactory/Completed Jul 93
Restart Static Article Tests	6 Jul 93	Ongoing
P-5 Enters Flight Test	6 Aug 93	Satisfactory/Ongoing
P-1 80% Air Ground Loads Testing	2 Jul 93	Satisfactory/Completed
T-1 Flutter Testing	18 Mar 93	Satisfactory/Completed
P-3 Climatic Hanger Testing	14 May 93	Satisfactory/Completed
T-1 High-AOA Phase II	30 Aug 93	Satisfactory/Completed
Inflight Reconfiguration	8 Sep 93	Satisfactory/Completed
P-1 Wing Modification	5 Oct 93	Satisfactory/Completed

Program Element: #0604231F
PE Title: C-17 Program

Project Number: 2569
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs

Date: February, 1994

T&E ACTIVITY (PAST 36 MONTHS)(Continued)

Event	Date	Results
P-1 100% Air Loads Testing	8 Oct 93	Ongoing
Single stick container delivery system airdrop	10 Nov 93	Satisfactory/Completed
P-3 All Weather Deployment	15 Jan 94	Ongoing

T&E ACTIVITY (TO COMPLETION)

Event	Date
Fuel System Simulator Qualification Tests (Phases B&C)	Jan 94
Static article tests completed	2Q FY 94
Initiate Dedicated IOT&E	Sep 94
Complete DT&E	1Q FY 95
Complete Dedicated IOT&E	2Q FY 95
Durability article tests completed	4Q FY 95

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604233F
PE Title: Specialized Undergraduate Pilot Training (SUPT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
53853 T-1A Tanker-Transport Training System (TTTS)								
2,337	2,205	2,188	0	0	0	0	0	16,986
54228 T-3A Enhanced Flight Screener (EFS)								
0	191	188	0	0	0	0	0	379
54102 Joint Primary Aircraft Training System (JPATS)								
2055	3,208	39,257	85,395	80,962	38,118	12,007	23,300	285,300
Total								
4,392	5,604	41,633	85,395	80,962	38 118	12,007	23,300	302,665

B. (U) BRIEF DESCRIPTION OF ELEMENT: Supports Air Education and Training Command's (AETC) implementation of Specialized Undergraduate Pilot Training (SUPT) and the Department of Defense initiative for joint pilot training. The T-1A is a derivative of the commercially available Beech 400A "Beechjet," missionized for the training role. The aircraft will accommodate an instructor and two students. The T-1A Ground Based Training System (GBTS) includes compatible simulators, mock-ups, courseware, syllabus, and student management and scheduling. The Tanker-Transport syllabus includes training in high and low altitude instrument approaches, crew coordination, asymmetric thrust situations, airdrop fundamentals, low-level navigation, airborne rendezvous, and cell formation. JPATS is a joint USAF/USN venture to replace the Services' fleets of primary trainer aircraft (T-37/T-34 respectively) and associated GBTS. The USAF is the lead or Executive Service. The T-3A Enhanced Flight Screener will be used at the United States Air Force Academy and Hondo Field, Texas to standardize flight screening prior to Specialized Undergraduate

Program Element: #0604233F
PE Title: Specialized Undergraduate Pilot Training (SUPT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Pilot Training (SUPT). The aircraft will be aerobatic certified and have side-by-side seating, dual stick controls, dual throttles, and tricycle gear. Since work in this PE involves the missionizing of commercial aircraft, the category of research being performed is 6.5, Engineering and Manufacturing Development (EMD).

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) 53853, T-1A Tanker-Transport Training System:
T-1A is a program to missionize a small business jet aircraft (Beech 400A) to implement the tanker-transport track of Specialized Undergraduate Pilot Training (SUPT).

(U) FY 1993 Accomplishments:
(U) - Provided mission support for operation of T-1A/T-3A System Program Office. Completed 30 Sep 93. ($2,337)

(U) FY 1994 Plans:
(U) - Provide mission support for operation of T-1A System Program Office. Completion date is 30 Sep 94. ($2,205)

(U) FY 1995 Plans:
(U) - Provide mission support. Completion date is 30 Sep 95. ($2,188)

(U) Work Performed By: Prime contractor is McDonnell-Douglas Training Systems (MDTS), St. Louis, MO. Aircraft subcontractor is Beech Aircraft, Wichita, KS; simulator subcontractor is Quintron, Chantilly, VA; courseware is being developed by MDTS.

(U) Related Activities:
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0604233F
PE Title: Specialized Undergraduate Pilot Training (SUPT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation APAF, Budget Activity BA 03, Program Title Tanker-Transport Training System								
164,566 (36)	152,665 (35)	186,525 (32)	55,796	11,486	0	0	0	1,038,549 (180)

(U) International Cooperative Agreements: Not applicable.

2. (U) 54228, T-3A Enhanced Flight Screener:
(U) The T-3A Enhanced Flight Screener, a missionized Slingsby Firefly, is a more capable and maneuverable replacement for the aging T-41. The T-3A will provide a more thorough assessment of candidates' capabilities, lowering washout in pilot training.

(U) FY 1994 Plans:
(U) - Provide mission support for operation of T-3A System Program Office. Completion date is 30 Sep 94. ($191)

(U) FY 1995 Plans:
(U) - Provide mission support. Completion date is 30 Sep 95. ($188)

(U) Work Performed By: Prime contractor is Slingsby Aviation Limited, United Kingdom. Aircraft production and contract logistics support is being performed by Northrop Worldwide Aircraft Services Inc., Lawton, OK.

(U) Related Activities:
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0604233F
PE Title: Specialized Undergraduate Pilot Training (SUPT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation APAF, Budget Activity BA 03, Program Title Enhanced Flight Screener								
13,708 (42)	11,511 (33)	0	0	0	0	0	0	41,113 (113)

(U) International Cooperative Agreements: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604233F
PE Title: Specialized Undergraduate Pilot Training (SUPT)
Project Number: #4102
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs
Date: February 1994

Project Title: Joint Primary Aircraft Training System (JPATS)

PHOTO NOT AVAILABLE

Program Element: #0604233F **Project Number:** #4102 **Date:** February 1994
PE Title: Specialized Undergraduate Pilot Training (SUPT) **Budget Activity:** #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs

POPULAR NAME: Joint Primary Aircraft Training System (JPATS)

A. (U) SCHEDULE/BUDGET INFORMATION ($ in thousands)

SCHEDULE	FY1993	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	To Complete
Program Milestones	-MS 0/I DAB 1/93 -MS I DAB 5/93		-MS II review 2/95					
Engineering Milestones				-A/C PDR 8/96 -A/C CDR 2/96 -OFT PDR 8/96	-OFT CDR 12/96		-MS III 1/99	
T&E Milestones		-Flt Eval Begins: 6/94				-A/C QT&E complete 12/97 -A/C MOT&E complete 9/98		-OFT DT/OT&E complete 1Q FY00
Contract Milestones	-1st A/C DRFP released 2/93 -2nd A/C DRFP released 7/93	-A/C RFP release 4/94 -GBTS DRFP SFI release 4/94 - Begin SS 5/94	-A/C contract award 2/95 -A/C contractor releases GBTS sub contract RFP 4/95	-Incorporate GBTS into aircraft contract 12/95				
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract		0	36,900	83,000	79,000	36,800	10,400	252,700 (6,600)
Support Contract	500	1,900	500	500	500	500	500	4,900 (0)
In-House Contract	1,555	1,308	1,157	1,295	1,262	818	1,107	26,200 (16,700)
GFE/Other			700	600	200	0	0	1,500 (0)
Total	2,055	3,208	39,257	85,395	80,962	38,118	12,007	285,300 (23,300)

Program Element: #0604233F
PE Title: Specialized Undergraduate Pilot Training (SUPT)
Project Number: #4102
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs
Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Joint Primary Aircraft Training System (JPATS) is planned as a joint USAF/USN venture to replace the Services' fleets of primary trainer aircraft (T-37 and T-34 respectively) and associated Ground Based Training Systems (GBTS). The aircraft and GBTS will be used to train entry level student aviators in the fundamentals of flying so they can transition into advanced training tracks leading to qualification as military pilots, navigators, and Naval Flight Officers. The program includes the purchase of aircraft, simulators, and other associated ground-based training devices, training management systems, instructional courseware, and logistics support. The category of research being performed is 6.5, Engineering and Manufacturing Development (EMD), since JPATS is planned to receive Milestone 2 approval in FY 1995.

(U) CHARACTERISTIC	THRESHOLD
Syllabus maneuvers, mission profiles (contact/familiarization, precision aerobatics, instrument, and navigation - high & low)	Accomplish all five mission profiles
Sustained speed, Knots True Air Speed (KTAS) at 1000 ft MSL, hot day	250, 270 (dash)
Operational G envelope	+6 to -3 symmetric, +4 to 0 asymmetric
Pressurization	3.5 (PSI differential)
Bird strike capability (KTAS) (4 lb bird, no catastrophic damage)	270
Ejection seat with survival kit (altitude/airspeed)	0 ft/60 KTS
Able to perform engine out landing	Runway
Anthropometric accommodation (sitting height in inches)	32.8 - 40
Able to be flown operationally from either cockpit	Yes
Stepped tandem	Yes
Exterior noise	FAR Part 36, most restrictive applicable standard
Instrument Flight Rules (IFR) certified instrumentation	IFR certified (selectable ADI/HSI)
Takeoffs/touch & go/land at main operating bases (runway length, ft)	5000

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   (U) - Completed Defense Acquisition Board (DAB) Milestone 0/I Review. (19 Jan 93)
   (U) - Completed DAB Acquisition Strategy Review. (19 May 93)
   (U) - Released aircraft draft request for proposal. First release on 1 Feb 93, second on 28 Jul 93. ($2,055)

Program Element: #0604233F
PE Title: Specialized Undergraduate Pilot Training (SUPT)
Project Number: #4102
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs
Date: February 1994

2. (U) FY 1994 Planned Program:
   (U) - Aircraft Source Selection; Mission Support; Ground Based Training System (GBTS) draft request for proposal (RFP) as solicitation for information (SFI). Completion date is Jun 94. ($3,200)
   (U) - Complete Acquisition Decision Memorandum (ADM)-directed Streamlining Working Group review.

3. (U) FY 1995 Planned Program:
   (U) - Award acquisition contract for manufacturing development phase. Completion date is Feb 95. ($36,900)
   (U) - GBTS RFP release, source selection, and mission support. Completion date is Dec 95. ($2,400)

4. (U) Program to Completion:
   (U) - This is a continuing program.
   (U) - Conduct aircraft qualification testing and evaluation. (projected completion date 1Q/98)
   (U) - Deliver aircraft. (projected completion date for first production aircraft delivery 1Q/98)

D. (U) WORK PERFORMED BY: Training System Program Office, Directorate for T-1A and JPATS, Wright-Patterson AFB, OH. Contractor(s) to be determined.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The Defense Acquisition Executive directed JPATS accommodate at least 80% of eligible women. The Acquisition Decision Memorandum (ADM) also directed the Air Force attempt to ensure equal percentages of the eligible populations of men and women be accommodated by JPATS.

2. (U) SCHEDULE CHANGES: All activities moved to the right because of a change in acquisition strategy. Acquisition strategy changed from two contractor to single contractor with government selection of GBTS subcontractor.

3. (U) COST CHANGES: Reflects program realignment as discussed in 2, above. Funding adjustments reflect reduction in aircraft buy from 418 to 373 (including a test aircraft).

Program Element: #0604233F
PE Title: Specialized Undergraduate Pilot Training (SUPT)
Project Number: #4102
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs
Date: February 1994

F. (U) PROGRAM DOCUMENTATION:

(U) - DoD Trainer Aircraft Master Plan, 15 Feb 89.
(U) - Joint Statement of Operational Need (JSON), 26 Sep 90.
(U) - Memorandum of Agreement (MOA) between the Department of the Navy and the Department of the Air Force, 30 May 91.
(U) - Joint System Operational Requirement Document (JSORD) for Joint Primary Aircraft Training System (JPATS), 22 Oct 91.
(U) - Program Management Directive (PMD) for Specialized Undergraduate Pilot Training (SUPT), 22 Jun 93.
(U) - Operational Requirements Document (ORD) for JPATS, 3 Apr 92.
(U) - Acquisition Program Baseline (APB) Agreement for JPATS, 19 Jan 93.
(U) - Acquisition Decision Memorandum (ADM) for JPATS, 19 Jan 93.
(U) - Acquisition Decision Memorandum (ADM) for JPATS, 7 Jul 93.
(U) - Revised Operational Requirement Document for JPATS, 1 Sep 93.

G. (U) RELATED ACTIVITIES:

(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation APAF, Budget Activity BA 03, Program Title: Joint Primary Aircraft Training System								
0	0	123,265 (3)	142,919 (10)	189,700 (24)	259,662 (36)	312,747 (48)	2,565,900 (251)	3,594,100 (372)
Appropriation 3300, Military Construction								
0	0	0	3,424	3,500	173	242	13,161	20,500

Program Element: #0x04233F **Project Number:** #4102 **Date:** February 1994
PE Title: Specialized Undergraduate Pilot Training (SUPT) **Budget Activity:** #5-Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Programs

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

None

T&E ACTIVITY (TO COMPLETION)

Event	Date	Results
Aircraft Flt Eval (source selection).	Begins June 94	None
Aircraft qualification test and evaluation complete.	Oct 97	None
Aircraft multi-service operational test and evaluation complete.	Jul 98	None
Ground Based Training System (GBTS) D/OT&E complete.	2001	None

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604237F
PE Title: Variable Stability In-Flight Simulator Test Aircraft (VISTA)
Budget Activity: #5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: #4, Tactical Programs

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
3308 Variable Stability In-Flight Simulator Test Aircraft (VISTA)									
	2,066	5,805	2,027	0	0	0	0	0	57,092
Total	2,066	5,805	2,027	0	0	0	0	0	57,092

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program modifies an F-16D to create a high-performance, flying simulator as a replacement for the NT-33A aircraft. For the past 36 years, the research and development flight test community has extensively employed the variable stability NT-33A for pre-first-flight evaluation of advanced aircraft. The NT-33A has been a veritable workhorse with a full schedule of test activities. Its success is directly attributable to its relatively low-cost of operation, rapid response to customer needs, and high degree of credibility in the flight test community. The NT-33A has been credited with identification of flight control deficiencies on the prototypes for the YF-17 and F-18. Undetected, such deficiencies could have resulted in loss of prototype aircraft. The NT-33 needs to be replaced because its performance is not representative of future aircraft (it's the oldest aircraft in the Air Force still actively flying). VISTA, a modified F-16D, will have the capability to simulate a wide range of air vehicles to identify crucial flight control and human factor design deficiencies before first flight. This program is in category 6.5, Engineering and Manufacturing Development, because it modifies an existing aircraft into a test asset to conduct flight test activities to simulate and verify aircraft prototype flight control and human factors requirements.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

(U) Project 3308, Variable Stability In-Flight Simulator Test Aircraft: VISTA will have the capability to simulate a wide range of air vehicles to: identify crucial flight control and human factor design deficiencies before first flight; establish flying qualities specification criteria; and operate as a flying laboratory for flight control and cockpit display research. An interim VISTA configuration will first be used as the testbed for a high angle-of-attack experiment. In addition, the Air Force and Navy Test Pilot Schools will use VISTA, as they have the NT-33A, to safely train test pilots to judge the deficiencies and characteristics for aircraft handling quality, avionics, and human factors in a realistic high performance environment. VISTA will be a national asset for continuing flight research.

Program Element: #0604237F
PE Title: Variable Stability In-Flight Simulator Test Aircraft (VISTA)
Budget Activity:#5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: #4, Tactical Programs

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) Performed limited operational utility evaluation of thrust vectoring in low-speed, high angle-of-attack maneuvering. ($2,066K)

(U) FY 1994 Planned Program:
- (U) Complete developmental flight testing to verify operational performance of final VISTA configuration. ($5,805K)

(U) FY 1995 Planned Program:
- (U) Complete acquisition of ground support equipment and basic F-16 spares. ($231K)
- (U) Complete developmental flight testing. ($1,596K)
- (U) Conduct aircraft physical and functional configuration audit and transition the completed VISTA to flight research. ($200K)

(U) Work Performed By: This project is managed by Wright Laboratory, Wright-Patterson AFB, OH. The prime contractor is Lockheed, Fort Worth Division, Fort Worth, Texas.

(U) Related Activities:
- (U) PE 0602201F, Aerospace Flight Dynamics.
- (U) PE 0603245F, Advanced Flight Technology Integration.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

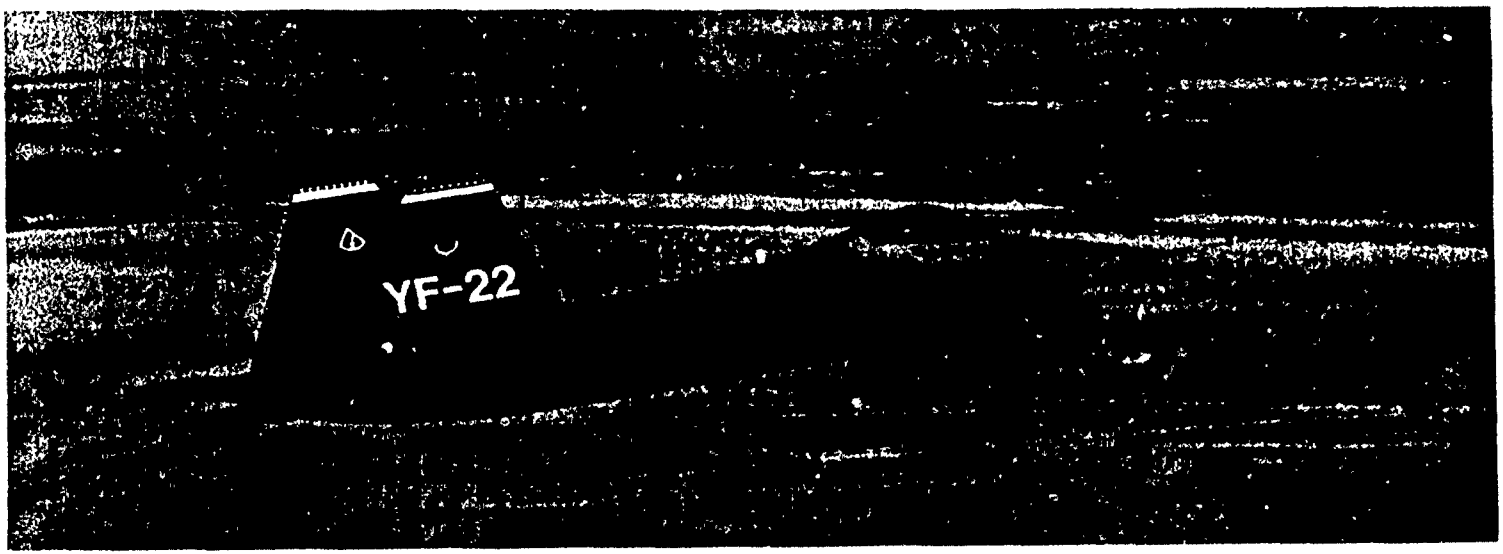
(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604239F
PE Title: F-22 EMD
Project Number: N/A
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

Project Title: F-22 EMD



Program Element: #0604239F **Project Number:** N/A **Date:** February 1994
PE Title: F-22 EMD **Budget Activity:** #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

POPULAR NAME: F-22

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

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones					DAB: PPV Full Release ; LRIP LL			DAB Review MS III 2QFY2002
Engineering Milestone	Air Vehicle PDR		Air Vehicle CDR	First Flight 2 Seat A/V CDR		First Avionics Flight		
T&E Milestones	First EMD Engine to Test			DT&E First Flight RR			IOT&E	Dedicated IOT&E
Contract Milestones				PPV LL	PPV Award First LRIP Lot LL	First PPV Del & LRIP Award	First LRIP Delivery	
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total* (To Complete)**
Major Contracts	1,881,958	2,025,945	2,399,249	2,257,020	1,493,481	909,047	688,182	12,456,888 (802,006)
Support Contracts	1,731	2,699	2,893	2,995	3,101	2,752	1,910	20,200 (2,119)
In-House Support	12,567	11,360	12,007	12,205	12,599	13,148	14,290	118,957 (30,781)
GFE/Other	28,943	42,900	47,000	46,300	73,780	96,280	124,804	700,329 (240,322)
Total	1,925,199	2,082,904	2,461,149	2,318,520	1,582,961	1,021,227	829,186	13,296,376 (1,075,230)

* Note: The program total reflects FY93 thru FY99 and To Complete funding. FY91/92 costs are not included. Schedule does not reflect impacts of FY94 budget reduction.

EMD - Engineering and Manufacturing Development; DAB - Defense Acquisition Board; MS - Milestone; PDR - Preliminary Design Review; CDR - Critical Design Review; LRIP - Low Rate Initial Production; T&E - Test and Evaluation; DT&E - Development Test & Evaluation; IOT&E - Initial Operational Test and Evaluation; PPV - Pre-Production Vehicle; GFE - Government Furnished Equipment; LL - Long Lead.

Program Element: #0604239F **Project Number:** N/A **Date:** February 1994
PE Title: F-22 EMD **Budget Activity:** #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: In FY1991 the F-22 received Milestone II approval to enter the Engineering and Manufacturing Development (EMD) phase and therefore this program element is included in budget activity 5. The F-22 program is developing the next-generation air superiority fighter for introduction in the early 2000's to counter emerging proliferating worldwide threats. The F-22 is designed to penetrate enemy airspace and achieve a first-look, first-kill capability against multiple targets. F-22 EMD effort is based on the Weapon System Specification formulated from data developed during the Dem/Val (Prototype) phase. The EMD program consists of design, fabrication, and development testing of 9 EMD flight test vehicles (7 single and 2 dual seat); design, fabrication, development testing, and delivery of 27 EMD flight qualified engines; updating of the Dem/Val Avionics Flying Laboratory into a Flying Test Bed (FTB) and using it to develop and integrate the EMD avionics suite; and design and development of F-22 weapon system support and training systems. The F-22 program from the outset has placed balanced emphasis on performance, survivability, reliability/maintainability, and affordability. The F-22 is characterized by a low observable highly maneuverable airframe, advanced integrated avionics and a new engine capable of supersonic cruise without using afterburner.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Accomplishments:
   (U) - Air Vehicle ($864.2M)
      (U) -- Completed Air Vehicle Preliminary Design Review (PDR). (Not Separately Priced (NSP))
   (U) - Avionics ($733.0M)
      (U) -- Continue Hardware/Software Design and Integration. (NSP)
   (U) - Engine ($328M)
      (U) -- Accomplished first EMD engine to test (FETT). (NSP)

2. (U) FY 1994 Planned Program:
   (U) - Air Vehicle ($1133.2M)
      (U) -- Finalize Flying Test Bed (FTB) test configurations. (NSP)
      (U) -- Initiate fabrication of EMD aircraft #1 parts. (NSP)
      (U) -- Continue subsystem design, development, and test activity. Accomplish approximately 80 percent of detailed weapon system design. (NSP)
      (U) -- Complete Training Systems Requirement Review Update (RRU). (NSP)

Program Element: #0604239F **Project Number:** N/A **Date:** February 1994
PE Title: F-22 EMD **Budget Activity:** #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) - Avionics ($727.0M)
- (U) -- Avionics system modeling/simulation results available. (Not Separately Priced (NSP))
- (U) -- Continue Avionics Subsystem design. (NSP)

(U) - Engine ($222.7M)
- (U) -- Continue engine development and test to optimize efficiency and durability. (NSP)

3. (U) FY 1995 Planned Program: ($1390.4M)
   - (U) -- Complete Air Vehicle Critical Design Review (CDR). (NSP)
   - (U) -- Complete Training System Requirements Review. (NSP)
   - (U) -- Continue to design/fabricate support system equipment for test. (NSP)
   - (U) -- Continue technical order development. (NSP)
   - (U) -- Conduct Training System integration Preliminary Design Review (PDR). (NSP)
   - (U) -- Continue assembly of Engineering and Manufacturing Development (EMD) aircraft #1. (NSP)
   - (U) -- Fabricate major sub-assembly items for EMD aircraft #2, #3, and Static Test aircraft. (NSP)
   - (U) -- Conduct Two-Seat Air Vehicle PDR. (NSP)
   - (U) -- Continue Detailed Design. (NSP)

   (U) - Avionics ($791.0MB)
   - (U) -- Continue development of initial (Block 0) software release. (NSP)
   - (U) -- Conduct Avionics Subsystem CDR. (NSP)

   (U) - Engines ($279.7M)
   - (U) -- Initiate fabrication of EMD flight test engines. (NSP)
   - (U) -- Continue engine development testing. (NSP)
   - (U) -- Begin Initial Flight Release test build-up. (NSP)

4. (U) Program to Completion ($6,827.1M)
   (U) - Complete assembly of EMD aircraft
   (U) - First Flight.
   (U) - Fabricate and test one static article and one fatigue article.
   (U) - Modify and use Flying Test Bed to support avionics testing.
   (U) - Complete Support Subsystem development.

Program Element: #0604239F **Project Number:** N/A **Date:** February 1994
PE Title: F-22 EMD **Budget Activity:** #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) - Aircraft testing includes: weapon compatibility, performance, flying qualities, observables, integrated avionics, climatic effects, SEEK EAGLE, support and training systems compatibility, and completion of Development, Test & Evaluation (DT&E).
(U) - Complete Production Readiness Review (PRR).
(U) - Milestone III.

D. (U) WORK PERFORMED BY: The F-22 Engineering and Manufacturing Development (EMD) program will be managed by the Aeronautical Systems Center (ASC), Wright-Patterson AFB, Ohio. Contracts have been awarded to Lockheed Aeronautical Systems Corporation in Marietta, Georgia and Pratt & Whitney Corporation in West Palm Beach, Florida.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) TECHNICAL CHANGES: The Department accelerated development of the F-22's inherent air-to-ground capability to provide capability at Initial Operational Capability (IOC). The F-22 will carry two internal 1000 lb Joint Direct Attack Munitions (JDAM).

2. (U) SCHEDULE CHANGES: This schedule does not reflect the impact of the FY94 Congressional Budget reductions nor FY95 Program Budget Decision reductions. The System Program Director expects an additional CDR slip of 3 months, first flight slip of 8 months, and consequent slips in later events.

3. (U) COST CHANGES: Cost changes reflect the addition of an Air-To-Ground capability (1000lb Joint Direct Attack Munition) and the revision of future year inflation indices. Additional cost increases are expected due to FY94 and FY95 budget reductions. A revised estimate is not available at this time.

F. (U) PROGRAM DOCUMENTATION:

(U) - TAF SON 304-83, Statement of Operational Need (SON) for Advanced Tactical Fighter, 9 Nov 84
(U) - TAF SORD 304-83-I/IIA, System Operational Requirements Document (SORD) Advanced Tactical Fighter, 1 Mar 91
(U) - Program Management Directive (PMD) 7036(19)/0603230F/0604239F, 12 Jan 94
(U) - Advanced Tactical Fighter Test and Evaluation Master Plan (TEMP), 2 Mar 92
(U) - F-22 Acquisition Program Baseline, 14 May 93.

Program Element: #0604239F **Project Number:** N/A **Date:** February 1994
PE Title: F-22 EMD **Budget Activity:** #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

G. (U) RELATED ACTIVITIES:

(U) - PE 0207219F, F-22 Procurement of first four planned for FY 1997 with advanced buy in FY1996.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

(U) Aircraft Procurement, Air Force (APAF), (BA 1) F-22

	FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete*	Total Program*
Cost	0	0	0	89,013	969,868	1,189,842	2,185,270	48,094,941	52,527,934
Quantity					4 (PPV)	4 (Lot 1)	12 (Lot 2)	422	442

*Based on FY93 Rephase and reduction in total quantity buy to 442.

(U) Military Construction Program

	FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
MILCON	0	0	4,550	7,100	3,800	9,900	4,100	142,710	184,250

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA:

(U) T&E ACTIVITY (PAST 36 MONTHS): Not applicable.

Program Element: #0604239F **Project Number:** N/A **Date:** February 1994
PE Title: F-22 EMD **Budget Activity:** #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

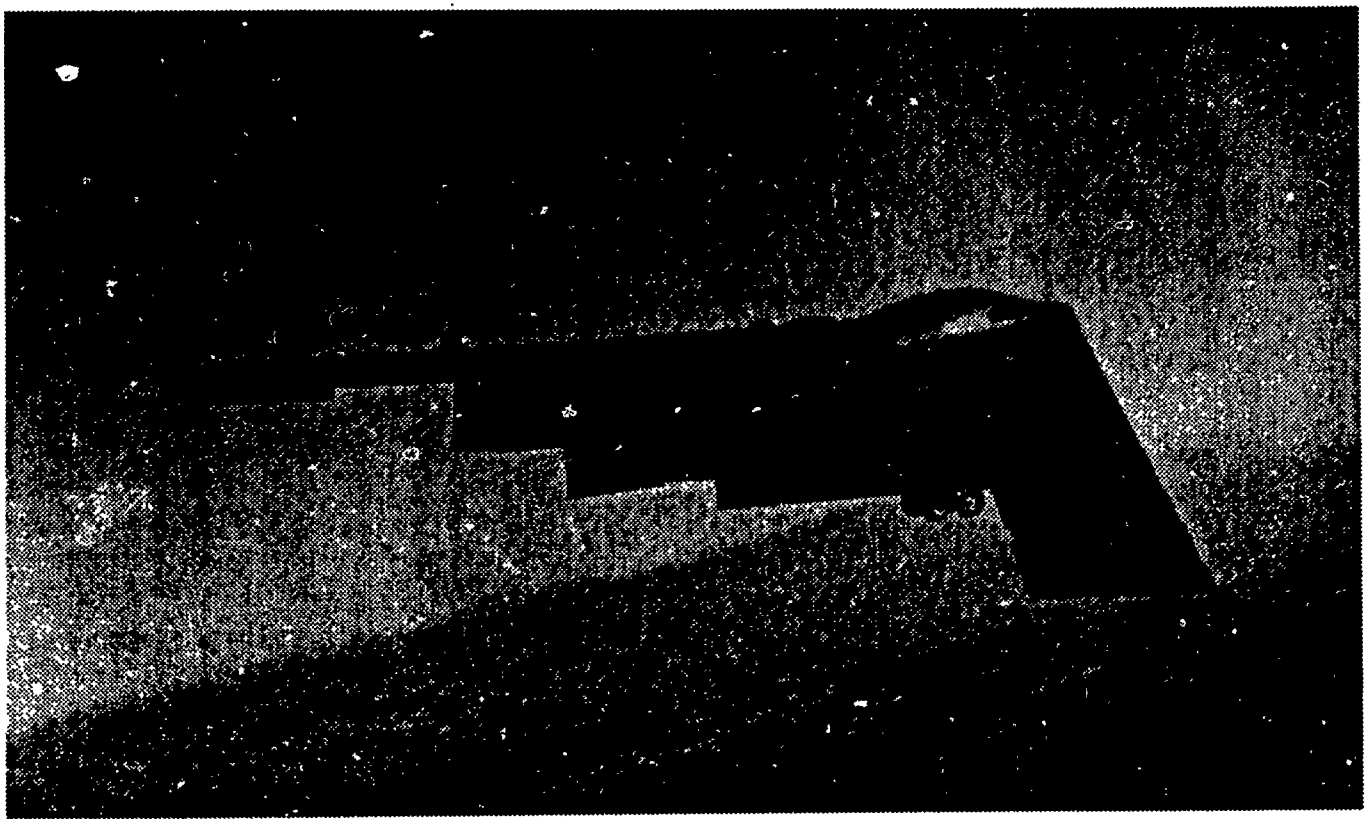
T&E ACTIVITY (TO COMPLETION)

	Event	Planned Date	Remarks
(U)	First Flight	June FY96	Likely to Slip to 2nd Qtr 97
(U)	Conduct combined Development Test and Evaluation/Initial Operational Test and Evaluation (DT&E/IOT&E) Flight Testing	FY96-FY01	

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #064240F
PE Title: B-2 (ATB)
Project: #3843
Budget Activity: #5-Engineering and Manufacturing Development
Old Budget Activity: #3-Strategic Programs
Date: February 1994

Project Title: B-2 Advanced Technology Bomber



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Program Element: #064240F
PE Title: B-2 (ATB)

Project: #3843
Budget Activity: #5-Engineering & Manufacturing Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

POPULAR NAME: B-2 BOMBER

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY1993	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	To Complete
Program Milestones	(U) First Flight air vehicle (AV)5 (U) First Flight AV 6 (U) First Flight Air Combat Command (ACC) 1	(U) Block 10-Dec 93 (U) ACC 1 Delivery (C) Required Assets Available (RA)	(U) Limited Operational Capability (LOC)-Jan 95	(U) 1st Block 20 (Jul) (U) Block 30-Sep 97	) Initial Operational Capability (IOC)-		Full Operational Capability (FOC)-	(U) Last Block 30 30-Jul-00
Engineering Milestones	(U) FY93 System Activity Matrix (SMM)							
T&E Milestones	(U) Complete AV-6 (Technical Order Verification and Validation (TOV&V)	(U) Complete Climatic Testing						
Contract Milestones	(U) Global Positioning System (GPS)/Band 4 undefinitized contract action (UCA) (U) Contrail Management System (CMS)/Joint Direct Attack Munition (JDAM) / UCA (U) Defensive Management System DMS) Tools UCA (U) MILSTAR UCA							

BUDGET ($000)	FY1993	FY1994	FY1995	FY1996	FY1997	FY1998	FY1999	Budget Total (To Complete)
Major Contract	1,000,821	523,963	255,738	358,326	312,630	281,610	131,542	20,925,006 (94,246)
Support Contract	75,521	91,094	46,666	44,109	40,145	23,538	0	1,605,687 (0)
In-House Contract	48,044	34,611	26,707	37,894	26,452	12,415	12,282	927,875 (2,770)
GFE/Other	64,904	136,152	79,432	71,506	69,593	110,488	18,097	1,199,432 (149,384)
Total	1,189,290	785,820	408,543	511,835	448,810	428,051	161,921	24,658,000 (246,400)

Program Element: #064240F
PE Title: B-2 (ATB)
Project: #3843
Date: February 1994
Budget Activity: #5-Engineering & Manufacturing Development
Old Budget Activity: #3-Strategic Programs

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The B-2 bomber exploits breakthroughs in low observables technology (radar, infrared, visual, electromagnetic, and acoustic) to achieve vehicle signatures that will allow penetration of current and postulated enemy air defenses. The B-2 will have the capability to perform worldwide conventional and nuclear delivery missions consistent with Air Combat Command requirements. Survivability will be enhanced by reduction of observable signatures and a complementary defensive management system. The B-2 will also have a low altitude terrain following capability and a penetration speed commensurate with high probability of survival without unduly penalizing mission range. The B-2 is an all-wing, two-crew aircraft with provisions for a third crew member and has twin weapons bays of over 20,000 pounds capacity each. It is powered by four F118-GE-100 turbofan engines. The low wing loading provides efficient cruise and good airfield performance. The research category for the program is 6.5. It is in engineering and manufacturing development phase.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS (THEN YEAR DOLLARS IN THOUSANDS):

1. (U) FY1993 Program:
   - (U) Continued flight test program. ($315,247)
   - (U) Continued developmental testing. ($63,348)
   - (U) Continued development of support items. ($303,348)
   - (U) Continued air vehicle development program. ($507,347)

2. (U) FY1994 Planned Program:
   - (U) Continued flight test program. ($156,705)
   - (U) Continued developmental testing. ($78,005)
   - (U) Continued development of support items. ($135,205)
   - (U) Continued air vehicle development program. ($415,905)

3. (U) FY1995 Planned Program:
   - (U) Continued flight test program. ($131,210)
   - (U) Continued developmental testing. ($16,713)
   - (U) Continued development of support items. ($72,610)
   - (U) Continued air vehicle development program. ($188,010)

Program Element: #064240F
PE Title: B-2 (ATB)

Project: #3843
Budget Activity: #5-Engineering & Manufacturing Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

4. (U) Program to Completion:
   - (U) Complete engineering and manufacturing development program in FY01.
   - (U) This is a continuing program.

D. (U) WORK PERFORMED BY: The B-2 program is managed by the B-2 System Program Office, Aeronautical Systems Center, Wright-Patterson AFB, Ohio. Northrop Corporation, B-2 Division, Pico Rivera, California, is the B-2 prime contractor and has overall integration responsibility for the development and production. Boeing Military Airplane Company, Seattle, Washington, and Vought Corporation, Dallas, Texas, are major subcontractors developing airframe components. General Electric Company, Aircraft Engine Group, Cincinnati, Ohio, is responsible for the development of the B-2 propulsion system. Several government agencies provide specialized assistance to the program. Included in these are the Air Force Materials Laboratory, Air Force Avionics Laboratory, and Air Force Aeromedical Laboratory at Wright-Patterson AFB, Ohio: Arnold Engineering Development Center in Tennessee; and the Air Force Operational Test and Evaluation Center and Phillips Laboratory at Kirtland AFB, New Mexico. The majority of flight test activity will be accomplished at the Air Force Flight Test Center, Edwards AFB, California, and the McKinley Climatic Lab, Eglin AFB, Florida, and will use numerous Department of Defense test ranges.

E. (U) COMPARISON WITH FY1993 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES:
   - (U) Plan, program, budget, and procure integration and certification of the Global Positioning System-Aided Targeting System (GATS)

2. (U) SCHEDULE CHANGES:
   - (U) N/A

3. (U) COST CHANGES:
   - (U) N/A

Program Element: #064240F
PE Title: B-2 (ATB)
Project: #3843
Budget Activity: #5-Engineering & Manufacturing Development
Old Budget Activity: #3-Strategic Programs
Date: February 1994

F. (U) PROGRAM DOCUMENTATION:

- (U) Strategic Air Command Statement Of Need 007-89-0, Feb 1990
- (U) Air Combat Command Operational Requirements Document 007-89-I/II/III, 3 Dec 1992
- (U) Program Management Directive 2020 (12), 8 Jul 1993
- (U) System Threat Assessment Report Draft, 15 Dec 92
- (U) B-2 Test and Evaluation Master Plan Draft, Dec 92

G. (U) RELATED ACTIVITIES:

- (U) The aircrew training devices and mission planning systems for the B-2 are funded in the B-2 baseline and managed by the B-2 System Program Office.
  - -- (U) The training devices include Weapon System Trainers, Mission Trainers, and a System Support Center (SSC).
  - -- (U) The mission planning systems include the Aircraft/Cruise Missile Force Application System (AFAS), the Strategic Mission Data Preparation System (SMDPS), and transition to the Air Force Mission Support System (AFMSS).
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS (THEN YEAR DOLLARS IN THOUSANDS):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 1, Program Title Aircraft Weapon System Procurement								
2,637,100	571,700	384,400	640,600	236,700	230,500	153,100	483,800	18,415,200
Appropriation 3010, Budget Activity 5, Program Title Aircraft Modifications								
0	21,900	64,400	21,200	5,800	6,300	4,600	300	126,200

Program Element: #064240F
PE Title: B-2 (ATB)
Project: #3843
Budget Activity: #5-Engineering & Manufacturing Development
Old Budget Activity: #3-Strategic Programs
Date: February 1994

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 6, Program Title Initial Spares								
0	185,100	2,400	17,600	55,800	95,100	91,300	270,600	1,410,300
Appropriation 3010, Budget Activity 7, Program Title Industrial Preparedness								
0	0	8,500	15,700	5,400	5,400	5,600	5,700	46,300
Appropriation 3300, Budget Activity 1, Program Title MILCON								
50,200	43,500	23,000	32,900	16,900	17,500	0	0	550,800
Appropriation 3020, Budget Activity 6, Program Title Weapons/Munitions								
0	0	0	3	?	3	3	0	12
Appropriation 3080, Budget Activity 2, 3, 4, Program Title Other Procurement								
32,600	37,500	500	68,200	26,100	23,000	12,000	500	277,400

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) TEST & EVALUATION DATA:

Program Element: #064240F
PE Title: B-2 (ATB)

Project: #3843
Budget Activity: #5-Engineering & Manufacturing Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

T&E ACTIVITY (PAST 36 MONTHS)

EVENT	DATE	RESULT
(U) Completion of FY91 System Maturity Matrix Milestones	Jan 91	Preliminary radar cross section (RCS) baseline signature assessment successfully accomplished.
(U) Air Vehicle (AV)-3 First Flight	18 Jun 91	Avionics systems test.
(U) Completion of FY92 System Maturity Matrix Milestones	Dec 91	Additional assessment of RCS baseline data; estimated air vehicle flight update; characteristics; AV-3 radar and navigation functional/integration; ground test weapon compatibility demonstration.
(U) AV-4 First Flight	17 Apr 92	Instrumentation check, flight controls, gear checks, aerial refueling.
(U) Completion of FY92 System Maturity Matrix Milestones	Sep 92	First weapon separation.
(U) Air vehicle (AV)-5 First Flight	5 Oct 92	Climatic testing, low observability, and OT&E integration.
(U) AV-6 First Flight	2 Feb 93	Tech Order Validation and Verification (TOV&V).
(U) AV-2 Marks 1,000th Flight Test Hour	10 Feb 93	

Program Element: #064240F
PE Title: B-2 (ATB)

Project: #3843
Budget Activity: #5-Engineering & Manufacturing Development
Old Budget Activity: #3-Strategic Programs

Date: February 1994

EVENT	DATE	RESULT
(U) Complete AV-1 Low Observable Closure Plan Validation Flight Test	Mar 93	Validate radar cross section (RCS) design.
(U) AV-1 Flyable Storage	Mar 93	
(U) AV-7 ElectroMagnetic Compatibility Testing	May 93	
(U) Started Terrain Following/Terrain Avoidance Testing	Nov 93	

T&E ACTIVITY (TO COMPLETION)

EVENT	DATE	REMARKS
(U) Block 20 & 30 Essential Employment Capabilities		Test areas to include mission survivability, fixed-target effectiveness, deployability, command and control, air refueling, all-weather flying qualities, ground mission planning, inflight mission planning, training, reliability/maintainability.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604243F
PE Title: Manpower, Personnel, and Training Development
Budget Activity: #5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: #6, Defensewide Mission Support

Date: February 1994

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
3816 Pilot Candidate Selection Method (PCSM)	52	0	0	0	0	0	0	0	5,570
3817 Base Training System (BTS)	371	149	0	0	0	0	0	0	3,116
3818 Maintenance Skills Tutors (MST)	2,692	4,662	4,636	4,293	4,190	4,334	4,494	Cont	TBD
Total	3,115	4,811	4,636	4,293	4,190	4,334	4,494	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This EMD program provides engineering development of manpower, personnel, and training (MPT) technologies to improve effectiveness of Air Force training development/delivery, performance, assessment, personnel acquisition, job assignment, force management, and human performance in weapon systems.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 3816, Pilot Candidate Selection Method (PCSM): PCSM will provide assessment tools to enable the Air Force to select the best qualified applicants for Specialized Undergraduate Pilot Training (SUPT). PCSM will field a test Processing Station and up to 250 computerized test stations, called Basic Attributes Testers (BATS), at Air Force Reserve Officer Training Corps detachments, selected Air Force bases, and Military Entrance Processing Stations. PCSM has demonstrated it will produce test scores that are highly predictive of future pilot training performance.

   (U) FY 1993 Accomplishments:
   - (U) Completed follow-on Operational Test and Evaluation of the PCSM. ($13K)
   - (U) Completed production of the PCSM system for Air and Educational Training Command. ($39K)

   (U) FY 1994 Planned Program: Not Applicable.

   (U) FY 1995 Planned Program: Not Applicable.

Program Element: #0604243F
PE Title: Manpower, Personnel, and Training Development
Budget Activity: #5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: #6, Defensewide Mission Support

Date: February 1994

(U) Work Performed By: This project is managed by Human Systems Center, Brooks AFB, TX. Contractor is CTA Inc., Denver, CO.

(U) Related Activities:
- (U) PE 0602205F, Personnel, Training, and Simulation.
- (U) PE 0804748F, Flight Screening.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 3817, Base Training System (BTS): The new and increasingly complex weapon systems and rapidly changing technology combined with major force reductions require personnel to be more efficient in the performance of their assigned duties. To ensure high job proficiency, the Air Force needs a more efficient system for training management. BTS is a computerized management system for all enlisted specialty and officer and civilian ancillary training which will improve management, administration, scheduling, and record keeping. The system is composed of Air Force standard computer hardware and ADA-based applications software.

(U) FY 1993 Accomplishments:
- (U) Rehosted the BTS software to a more cost-effective computer platform, the IBM RISC 6000. ($221K)
- (U) Completed development and test of the deployable BTS (D-BTS). ($150K)

(U) FY 1994 Planned Program:
- (U) Document system design and lessons learned for future Air Force or Department of Defense system development. ($20K)
- (U) Close out contractual actions. ($129K)

(U) FY 1995 Planned Program: Not Applicable.

(U) Work Performed By: This project is managed by the Human Systems Center, Brooks AFB, TX. Contractors are: McDonnell Douglas Training Systems, St. Louis, MO; and Mei Technology Corporation, Lexington, MA.

(U) Related Activities:
- (U) PE 0602205F, Personnel, Training, and Simulation.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

Program Element: #0604243F
PE Title: Manpower, Personnel, and Training Development
Budget Activity: #5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: #6, Defensewide Mission Support

Date: February 1994

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3818, Maintenance Skills Tutors (MST): MST will field multiple computer-based tutors for the Combat Air Forces to improve training of complex maintenance troubleshooting skills for a broad range of Air Force jobs. This is not initial skills training, but involves the more difficult skills of understanding and troubleshooting problems that the maintenance aiding equipment and systems are unable to diagnose.

(U) FY 1993 Accomplishments:
- (U) Refined and field tested F-15 avionic intermediate shop tutor software. ($850K)
- (U) Conducted trade study to determine best software language for and reusability of F-15 tutor. ($550K)
- (U) Designed F-16 A and C Shop avionics tutor. ($1,292K)

(U) FY 1994 Planned Program:
- (U) Continue development of F-16 A and C shop avionics tutors and design F-16 B shop avionics tutor. ($2,410K)
- (U) Modify and field F-15 avionics intermediate shop tutor. ($1,100K)
- (U) Evaluate tutor avionics capabilities. ($1,152K)

(U) FY 1995 Planned Program:
- (U) Complete development and fielding of the F-16 flightline avionics A and C shop tutors. ($1,500K)
- (U) Continue development of the F-16 flightline avionics B shop tutors. ($2,736K)
- (U) Field two F-15 flightline avionics tutors. ($400K)

(U) Work Performed By: This project is managed by Human Systems Center, Brooks AFB, TX. Major contractors are Learning Research and Development Center, Pittsburgh, PA; Bolt, Beranek, and Neuman (BBN) Inc., Cambridge, MA; Galaxy Company, Atlanta, GA.

(U) Related Activities:
- (U) PE 0602205F, Personnel, Training, and Simulation.
- (U) PE 0603227F, Personnel, Training, and Simulation Technology.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604249F
Date: February 1994
PE Title: Night/Precision Attack
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 Tactical Programs

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2693 LANTIRN								
6,700	0	21,672	753	928	0	0	0	559,973
3920 Night Attack Program (NAP)								
1,994	0	0	0	0	0	0	0	14,495
Total								
8,694	0	21,672	753	928	0	0	0	574,468

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element is devoted to Engineering and Manufacturing Development (EMD) of LANTIRN (Low Altitude Navigation and Targeting InfraRed for Night) and other night-attack related aircraft equipment and is therefore included in budget activity 5 (EMD). The program element contains two separate projects which contribute to Air Force capabilities to conduct successful interdiction and Close Air Support (CAS) mission. Development funds complete the ongoing LANTIRN (Low Altitude Navigation and Targeting InfraRed for Night) program with integration and development flight testing on F-15E and F-16 Block 40 production aircraft. It provides the Combat Air Forces the capability to conduct CAS and interdiction missions at night and in conditions of limited visibility with precision laser guided weapons. The Night Attack program will develop, test, and evaluate night vision technologies for future enhancement to F-16 and A-10 aircraft.

Program Element: #0604249F **Date:** February 1994
PE Title: Night/Precision Attack
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #4 - Tactical Programs

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995

1. (U) 3920 Night Attack Program (NAP): The need for enhanced night attack capabilities is documented in TAF SON 312-88 (10 May 89) for a Follow-on Close Air Support (CAS) aircraft. This project requested funding in FY94 to support a Block 30, Head-Steered InfraRed System/Helmet Mounted Display (HSIR/HMD) equipped F-16 and a Forward Looking InfraRed (FLIR) enhancement to the A-10.

(U) FY 1993 Program: CAS development effort on hold during FY93, pending notification to Congress of planned program. Notification will be provided, and the funds released for execution, during FY94. ($2.0M)

(U) FY 1994 Planned Program:
- (U) - FY94 funding denied due to lack of clearly defined Close Air Support (CAS) program. Withheld FY93 funds will be available for CAS development subsequent to Congressional notification of restructured CAS program. Agreement has been reached, and the CAS report has been completed and will be submitted during FY94.
- (U) - Project funds to be used by F-16 program to support initiation of CAS development. ($2.0M - FY93).

(U) FY 1995 Planned Program:
- (U) - Project funds transferred to LANTIRN project to support development of Laser Spot Tracker.

(U) Program to Completion: Program funding for CAS was transferred to F-16, PE 27133F, for FY96 and outyears.

(U) Work Performed By: Contractors are undetermined at this time. The F-16 program office, Aeronautical Systems Division, Wright-Patterson AFB OH will select required contractors.

(U) Related Activities:
- (U) PE 0207131F, A-10 Squadrons
- (U) PE 0207133F, F-16 Squadrons
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Procurement of F-16 CAS equipment funded under PE 27133F.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0604249F
PE Title: Night/Precision Attack
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
LANTIRN								
6,700	0	21,672	753	928	0	0	0	574,962

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The need for LANTIRN is documented in Tactical Air Forces' Statement of Operational Need 302-81, Night Attack Capabilities. LANTIRN responds to that need by providing the capability to conduct close air support and interdiction missions at night and under-the-weather for F-15E and F-16C/D fighter aircraft. LANTIRN provides the capability not only to attack at night, but also to attack with precision laser guided weapons day or night and in conditions of limited visibility. The LANTIRN program includes development and testing of a wide angle raster head-up display, a navigation pod, and a targeting pod. The navigation pod contains a terrain following radar and a fixed Forward-Looking InfraRed (FLIR) sensor; the targeting pod contains a gimbaled FLIR, a laser designator, an automatic tracker, a missile boresight correlator, and growth provisions for an automatic target recognizer.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Congress directed withhold of FY93 funds pending AF/OSD agreement on CAS program. $1.8M released for LANTIRN non-CAS related development. Report on restructured CAS program will be provided to Congress during FY94 ($4.9M - Withheld)
   - (U) - Developed corrective actions for field service report discrepancies on F-16 and F-15E. ($0.3M) (Sep 93)
   - (U) - Initiated test program to determine technical causes of pod deficiencies during Desert Storm. ($0.2M) (Jun 93)
   - (U) - Implemented software changes resulting from initial operational use of the targeting pod. ($1.3M) (Sep 93)

Program Element: #0604249F
PE Title: Night/Precision Attack
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) - FY94 funding denied due to lack of clearly defined Close Air Support (CAS) program. Withheld FY93 funds will be available for CAS development subsequent to Congressional notification of restructured CAS program. Agreement has been reached, and the CAS report has been completed and will be submitted during FY94.
   - (U) - Risk reduction efforts for development of Laser Spot Tracker (LST) to support CAS program ($4.9M - FY93) (Aug 94)

3. (U) FY 1995 Planned Program:
   - (U) - Initiate development of targeting pod laser spot tracker capability for incorporation into the F-16 Block 40/42 production aircraft. ($17.0M) (Aug 95)
   - (U) - Complete development, evaluation, integration, flight test, documentation and fielding of hardware/software corrections to pod deficiencies observed in Desert Storm. ($.2M) (Jun 95)
   - (U) - Identify corrective actions to discrepancies identified in field service reports. ($.1M) (Sep 95)
   - (U) - Flight test 1995 OFP software changes resulting from anticipated changes in the F-16 and F-15E software suites. ($4.2M) (Aug 95)
   - (U) - Initiate planning for production of laser spot tracker capability for F-16 Block 40/42 aircraft. ($.2M) (Jun 95)

4. (U) Program to Completion:
   - (U) - Complete development of targeting pod laser spot tracker capability for incorporation into F-16 Block 40/42 production aircraft. (Aug 96)
   - (U) - Complete production plans for incorporating a laser spot tracking capability into F-16 Block 40/42 production aircraft. (NSP) (Nov 96)
   - (U) - Identify corrective actions to discrepancies identified in field service reports.
   - (U) - Continue flight testing of software changes resulting from changes in the F-16 and F-15E software suites as well as those required to ensure the LANTIRN system remains compatible with F-15E and F-16 Block 40/42 aircraft. Incorporate these software updates in the 1996, 1998 and 1999 Operational Flight Program (OFP). OFP updates will be a continuing part of the LANTIRN program. (This is a continuing requirement with estimated cost of $2.0M per year)

Program Element: #0604249F
PE Title: Night/Precision Attack
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

D. (U) WORK PERFORMED BY: The LANTIRN program office is located at Aeronautical Systems Center, Wright-Patterson Air Force Base OH. The LANTIRN prime contractor is Martin Marietta, Orlando FL. Major subcontractors include Texas Instruments, Dallas TX, for the terrain following radar; Delco Systems Operations, Goleta CA, for the advanced pod control computer; Litton Laser Systems, Apopka FL, for the laser designator ranger; Litton Poly-Scientific, Blacksburg VA, for the dual slip ring and rotary fluid joint; and Sunstrand Power Systems, San Diego CA, for the environmental control unit. F-16/LANTIRN integration work is performed by the General Dynamics Corp., Ft. Worth TX. F-15E/LANTIRN integration work is performed by the McDonnell Douglas Corp, St Louis MO.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: Plans to initiate development of a targeting pod laser spot tracker capability are on hold until concerns about the F-16 Close Air Support program are resolved.

3. (U) COST CHANGES: Congress denied all FY94 funding. FY93 withheld funds will be released pending Congressional notification of restructured Close Air Support (CAS) Program. There will be shortfalls in FY96 and beyond due to the delay in the Laser Spot Tracker project. The exact amount is dependent on when direction to proceed with Close Air Support development activities is provided.

F. PROGRAM DOCUMENTATION: List all program documentation and date, e.g.
- (U) Tactical Air Forces Statement of Need 302-81, 2 Nov 82 and Amendment 1, 29 Dec 86 (S)
- (U) System Operational Requirements Document 301-81-I/II/III-A for LANTIRN, 20 Oct 89 (S)
- (U) LANTIRN Acquisition Program Baseline, 31 Jan 92

G. RELATED ACTIVITIES:
- (U) Program Element 0207249F, LANTIRN Procurement
- (U) Program Element 0207133F, F-16 Squadrons
- (U) Program Element 0207134F, F-15E Squadrons

Program Element: #0604249F
PE Title: Night/Precision Attack
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.
- (U) Joint Potential Designator is not applicable (LANTIRN is a post MS IIIB program).

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3010. Aircraft Procurement			Budget Activity: 07		Program Title: LANTIRN Procurement			
11,651	25,948	16,147	22,292	45,083	11,446	12,654	N/A	3,431,004
Quantity: (Laser Spot Tracker)		20	180					200

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) MILESTONE SCHEDULE: List the essential program decision, engineering, T&E and contract milestones for the project.

1.	(U) Full Rate Production Decision (Navigation Pod)	Oct 86
2.	(U) Complete FOT&E	Apr 87
3.	(U) Full Rate Production Decision (Targeting Pod)	Dec 88
4.	(U) Required Assets Available (Navigation Pod)	Sep 89
5.	(U) Required Assets Available (Targeting Pod)	Dec 90
6.	(U) Final Delivery (Navigation Pod)	Mar 92
7.	(U) Software Release for FY93 OFP (F-16 Block 40/42 & F-15E)	Mar 93
8.	(U) Flight Test Complete (FY93 OFP Release)	Nov 93
9.	(U) Organic Depot (Target Pod)	Apr 94
10.	(U) Organic Depot (Support Equipment)	May 94
11.	(U) Final Delivery (Target Pod)	FY94

Program Element: #0604249F **Date:** February 1994
PE Title: Night/Precision Attack
Budget Activity : #5 - Engineering and Manufacturing Development (EMD)
Old Budget Activity : #4 - Tactical Programs

12.	(U) Software Release for FY95 OFP (F-16 Block 40/42 & F-15E)	Jun 95
13.	(U) Software Release for FY96 OFP (F-16 Block 40/42 & F-15E)	4th Qtr FY96
14.	(U) Software Release for FY98 OFP (F-16 Block 40/42 & F-15E)	2nd Qtr FY98

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604256F
PE Title: Threat Simulator Development
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
1209 * EMP Simulation Test Facilities								
2,755	0	0	0	0	0	0	N/A	N/A
1006 ** HAVE NOTE								
944	1,000	912	918	924	1,035	1,043	Cont	TBD
3321 *** Electronic Combat Test Resources								
0	37,491	32,962	46,111	35,533	27,381	23,085	Cont	TBD
6510 *** Flight Test Threat System Simulators								
0	3,140	6,201	14,652	14,059	12,159	6,518	Cont	TBD
Total								
3,699	41,631	40,075	61,681	50,516	40,575	30,646	Cont	TBD

* This project was funded by PE 0604747F in FY 1993. Responsibility for these facilities was transferred to the Army in FY 1994.
** This project was funded by PE 0604747F in FY 1993. (1006 formerly 2064)
*** These projects were funded by PE 0604735F in FY 1993.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This PE consolidates electronic combat test efforts previously funded in PE 0604747F and PE 0604735F. This consolidated PE provides funding for the elements necessary to support the AF Electronic Combat (EC) Test Process. This test process provides a methodology to ensure the effective disciplined and efficient testing of AF EC and avionics systems. Each capability or facility improvement is pursued in concert with the others so as to avoid duplicate capabilities while at the same time produce the proper mix of test resources needed to support the AF EC Test Process. This PE provides funding for the management and technical oversight of implementation activities, AF support of the tri-Service effort to establish a common modeling and simulation architecture, measurement facilities operation and improvements, hardware in the loop test facilities operation and improvements, installed system test facility improvement, and development and improvement of open air threat simulators for flight testing.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) 1209, EMP Simulation Test Facilities: Funded acquisition and support of the Phillips Laboratory test facilities which simulate nuclear Electromagnetic Pulse (EMP) environments in which weapon systems may be required to operate. The principal EMP simulators used to test aircraft and large missiles are the Vertically and Horizontally Polarized Dipoles and the TRESTLE. The Air

Program Element: #0604256F
PE Title: Threat Simulator Development
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

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Force Weapons Lab (AFWL)/Los Alamos Electromagnetic Calibration and Simulation (ALECS) Facility, a smaller simulator, is used to test small missiles and communications equipment.

(U) FY 1993 Accomplishments ($2.755M):
- (U) Planned for B-2 System Level EMP testing.
- (U) Conducted B-1B hardness maintenance and surveillance test.
- (U) Maintained capability to support MAJCOM EMP T&E and operational support requirements as required.
- (U) Continued EMCAF support.

(U) FY 1994 Plans: Not applicable. (Management responsibility of these facilities has been transferred to the Army.)

(U) FY 1995 Plans: Not applicable.

(U) Work Performed by: Project 1209 was managed by the Phillips Laboratory, Kirtland AFB, NM. BDM International, Inc., McLean, VA, was facilities support contractor.

(U) Related Activities:
- (U) There is no unnecessary duplication of effort in the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): None.

(U) International Cooperative Agreements: None.

2. (U) Project 1006, HAVE NOTE: Developed, improved and supported the Rome Laboratory Electromagnetic Radiation (EMR) test facilities including an anechoic chamber for free space electromagnetic environments simulations; a mode-tuned reverberation chamber for rapid "quick look" evaluations; a small anechoic chamber for fuse and subsystem evaluations; and a radio frequency (RF) and microwave instrumentation development facility. The electromagnetic susceptibility data produced at these facilities is used to perform weapon system and C3I system vulnerability assessments and update test methods, acquisition specifications, hardening design guidelines, and maintenance of technical orders.

(U) FY 1993 Accomplishments:
- (U) Completed vulnerability assessments of GBU-15/AGM-130 IDL. Continued support to AMRAAM APREP hardware. Continue susceptibility measurements of SFW production hardware. Completed E-3RC ADACS

Program Element: #0604256F
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computer hardware replacement. Began transfer of ADACS software to new computer hardware. Completed revision of MIL HDBK-335. ($0.944M):

(U) FY 1994 Plans:
- (U) Continue operation, development and improvement of Electromagnetic Environmental Effects assessment facility. Provide capability for Vulnerability Assessment of AMRAAM APREF Program Hardware. Provide capability for Vulnerability Assessment of DSU-33C Proximity Fuse. Complete Vulnerability Assessment of Sensor Fuzed Weapon (SFW) Producibility Transition Program (PTP) hardware. Publish MIL-HDBK-335 update. Complete ADACS Software Transfer and validation for AMRAAM Vulnerability Assessment. Establish support to Joint Attack Missile (JDAM) SPO. ($1.000M)

(U) FY 1995 Plans:
- (U) Continue operation, development and improvement of Electromagnetic Environmental Effects Assessment Facilities. Configure anechoic chamber to begin Vulnerability Assessment of SFW P3I hardware. Procure replacement of $400K multiband high power TWT power supply and modulator. Prepare and instrument anechoic chamber facility to support JDAM SPO. ($.912M)

(U) Work Performed by: Rome Laboratory, Griffiss Air Force Base, NY. The facility and engineering support contractor is Rome Research Corporation, New Hartford, NY.

(U) Other Appropriation Funds ($ in Thousands): Not applicable.

(U) International Cooperative Agreements: None.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604256F
PE Title: Threat Simulator Development

Project Number: 3321
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

Project Title: Electronic Combat Test Resources

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
*	37,491	32,962	46,111	35,533	27,381	23,085	Cont	TBD

* Funds were provided from PE 0604735F, Range Improvement.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The AF requires a comprehensive set of ground test facilities to implement the Air Force EC Test Process. In order that program risk throughout the weapon system acquisition life cycle is managed effectively and flight testing is conducted effectively and efficiently, a range of ground test capabilities from modeling and simulation architecture to installed system test facility are required. The EC Test Process Support task provides for management, and coordinated technical oversight of the investment in and application of EC test facilities including analyses, studies and related documentation. The Joint Modeling and Simulation System (J-MASS) is an Air Force-led, Tri-Service project to establish a DoD-wide common digital simulation architecture in support of test and evaluation. Uses reusable ADA language modules and object oriented structure. This standard architecture will provide for credibility and correlation of test and evaluation results for all phases of the weapon system acquisition life cycle. The Hardware in the Loop (HITL) test facilities evaluate electronic support and countermeasures effectiveness prior to installation on the aircraft. Together the two AF HITL facilities, the Air Force Electronic Warfare Evaluation Simulator (AFEWES) and the Real-Time Electromagnetic Digitally Controlled Analyzer and Processor (REDCAP), provide the ability to realistically evaluate hardware components against manned hardware threat representations early enough to affect final system design. The Electronic Combat Integrated Test (ECIT) project upgrades the AF installed system test facility (ISTF) at Edwards AFB, CA. The ISTF provides for thorough weapon system evaluation in a large instrumented anechoic chamber prior to and during flight test. The ability to test Electronic Counter-countermeasures (ECCM) effectiveness of weapons systems is also supported by this project. ECCM test capabilities are developed and incorporated at Eglin AFB, FL. Finally, this project provides unique antenna measurement and analysis facilities at Rome Laboratory, NY. These far field antenna measurement facilities provide a timely, cost effective submission of critical data needed by SPOs and DOD agencies and contractors.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program: See PE 0604735F.

Program Element: #0604256F
PE Title: Threat Simulator Development

Project Number: 3321
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) EC Test Process Support. Further analyze existing test facility capabilities to support AF EC Test Process. Evaluate consolidation alternatives. Improve inter-facility correlation of test results. Investigate mechanisms to link test facilities for simultaneous testing. Improve EC Test Process implementation. ($1.466M)
   - (U) J-MASS. Continue development of enhanced modeling and simulation architecture to support many-on-many simulations and real-time applications. Begin development of a few-on-few modeling capability. Upgrade to latest Distributed Interactive Simulation (DIS) interface standard. ($1.444M)
   - (U) AFEWES Operation and Upgrade. Continue operation of the AFEWES in support of Army, Navy, Air Force and non-DoD customers. Continue work on the Reconfigurable Airborne Interceptor (RAI) simulator to provide closed-loop simulations of three air-to-air threat radars. Begin work on the Reconfigurable Surface-to-Air Missile (RSAM) simulator to provide a closed-loop simulation of a critical SAM radar. Continue work on the Test Director System (TDS) to provide improved test control and data analysis capabilities. Complete the Multi Emitter Generator (MEG) which evaluates radar warning receivers and power managed ECM systems. ($10.108M)
   - (U) REDCAP Operation and Upgrade. Continue REDCAP operations in support of Army, Navy, Air Force and non-DoD customers. Complete development of partial ground IADS, the architecture segment, and the link capability. Begin efforts to integrate the existing surveillance radars into the upgraded simulators. ($11.057M)
   - (U) ECIT. Continue development of generic EC and avionics installed system test capabilities. Begin development of RF target generator system. Begin development of phase measurement capability. Begin development of electro-optical/infrared (EO/IR) target generator. Begin technology development and trade studies of alternatives for risk reduction. ($10.270M)
   - (U) ECCM. Complete GWEF GPS simulation to provide time-space position information for ECCM analysis. Complete develop of a Reconfigurable Ground Jammer for weapons ECCM testing. ($0.932M)
   - (U) Rome Laboratory Antenna Measurement Facilities. Continue operation, development and improvement of ground and airborne far field antenna measurement and analysis facilities in support of SPOs and DOD agencies and contractors. Complete computer, data and fiber optic network linking Rome Lab facilities and customers. Establish new low reflectivity test range and provide 967,000 pattern measurements for F-22 DNI and EW PDRs. ($2.214M)

3. (U) FY 1995 Planned Program:
   - (U) EC Test Process Support. Continue to analyze existing test facility capabilities to support AF EC Test Process. Evaluate consolidation alternatives. Improve inter-facility correlation of test results. Investigate mechanisms to link test facilities for simultaneous testing. Improve EC Test Process implementation. ($1.300M)
   - (U) J-MASS. Achieve IOC for enhanced J-MASS architecture, hardware-in-the-loop, and operator-in-the-loop capabilities. Increase speed and efficiency of simulations by connecting multiple processors. Continue interface development for legacy models. Continue development of enhanced modeling and simulation architecture to support many-on-many simulations and real-time applications. ($2.500M)

Program Element: #0604256F
PE Title: Threat Simulator Development

Project Number: 3321
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

- (U) AFEWES Operation and Upgrade. Continue operation of the AFEWES in support of Army, Navy, Air Force and non-DoD customers. Continue work on the Reconfigurable Airborne Interceptor (RAI), Reconfigurable Surface to Air Missile (RSAM) simulators, and Test Director System. Integrate the Multi Emitter Generator (MEG) with the RAI Simulator to provide multiple threat signals to the jammer being tested against the RAI. ($8.840M)
- (U) REDCAP Operation and Upgrade. Continue REDCAP operations in support of Army, Navy, Air Force and non-DoD customers. Continue integration and documentation efforts between existing REDCAP radars and the new upgrade REDCAP simulator. ($7.000M)
- (U) ECIT. Continue development of generic EC and avionics installed system test capabilities. Continue development of RF target generator system. Continue development of phase measurement capability. Continue development of electro-optical/infrared (EO/IR) target generator. Continue technology development and trade studies of alternatives for risk reduction. ($9.367M)
- (U) ECCM. Begin acquisition of additional MMW simulator channel for ECCM efforts in GWEF and initiate for PRIMES the procurement of a Scenario Controller, an EO/IIR Imaging simulator, and an Advanced Avionics Simulator for stores management. ($1.955M)
- (U) Rome Laboratory Antenna Measurement Facilities. Continue operation, development and improvement of ground and airborne far field antenna measurement and analysis facilities. Optimize range to support F-22 Aperture Development Program. Provide capability to support AF Special Operations Command, Warner Robins ALC, and 412th TW C-130 Gunship EW and Advanced Signal Collection Upgrade Programs. Develop capability to support the F-15 production decision on Manned Destructive Suppression of Enemy Air Defenses Program. Modify B-1B test bed to support the Conventional Mission Upgrade Program. ($2.000M)

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

D. (U) WORK PERFORMED BY: Portions of this project are managed by ASC, Wright-Patterson AFB, OH; 46 Test Wing, Eglin AFB, FL; Rome Laboratory, Griffiss AFB, NY; and the AFFTC, Edwards AFB, CA. Major contractors include Lockheed Corporation, Fort Worth, TX (AFEWES); Calspan Corporation, Buffalo, NY (REDCAP); Hughes Aircraft Corporation, Los Angles, CA; Georgia Tech Research Institute, Atlanta, GA; and Rome Research Corp., Rome, NY.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

Program Element: #0604256F
PE Title: Threat Simulator Development

Project Number: 3321
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

2. (U) SCHEDULE CHANGES: REDCAP SUAWACS/BMC3 project will complete in 1Q FY 94 (vs 3Q FY 95). REDCAP Architecture/Link project upgrade IOC and AFEWES RSAM project will complete in 4Q FY 95 (vs 2Q FY 96/3Q FY 96, respectively).

3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
(U) AFOTEC/AFSC/SAC/AFSOC MNS: Weapon System Test Capability, 12 May 92
(U) AFSC SON 004-89, Electronic Combat Integrated Test Capability, 6 Dec 89

G. (U) RELATED ACTIVITIES:
(U) Navy and Army also engage in electronic combat T&E infrastructure development programs.
(U) All USAF threat simulator programs, including portions of this project are reviewed by the CROSSBOW-S Committee and the DoD Executive Committee on Threat Simulators (EXCOM).
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ In Thousands):

Appropriation 3300, Budget Activity Defense-Wide Mission Support, Program Title Electronic Combat Integrated Test (ECIT)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
0	0	16,600	7,300	0	0	0	0	23,900

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:

1.	(U) REDCAP SUAWACS/BMC3 project complete.	1st Qtr FY 94
2.	(U) AFEWES TDS IOC.	2nd Qtr FY 94
3.	(U) REDCAP Architecture/Link project upgrade IOC.	4th Qtr FY 94
4.	(U) AFEWES RAI upgrade IOC.	3rd Qtr FY 95
5.	(U) J-MASS enhanced architecture development complete.	4th Qtr FY 95
6.	(U) Rome Lab multi-spectral capability to support F-22 complete.	4th Qtr FY 95
7.	(U) REDCAP IADS IOC.	4th Qtr FY 94
8.	(U) ECIT EO/IR target generators & test director comm complete.	3rd Qtr FY 96

Program Element: #0604256F
PE Title: Threat Simulator Development

Project Number: 3321
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

9.	(U) Rome Labs Improved Precision Airborne Antenna Measurement Sys	4th Qtr FY 96
10.	(U) ECIT infrastructure, generic test cap, and RF igt generator available.	2nd Qtr FY 97
11.	(U) AAIS Initial Operational Capability.	4th Qtr FY 98
12.	(U) ECIT Phase measurement & RCS R&M tasks complete.	4th Qtr FY 98
13.	(U) ECIT Multi-spectral correlation/measurement capability available.	4th Qtr FY 99
14.	(U) AFEWES RSAM project complete.	4th Qtr FY 00

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604256F
PE Title: Threat Simulator Development
Project Number: 6510
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

Project Title: Flight Test Threat System Simulators

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
*	3,140	6,201	14,652	14,059	12,159	6,518	Cont	TBD

* Funds were provided from PE 0604735F, Range Improvement.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project funds those simulators, including integral turn-key and minor construction (such as accomplished for the SADS XI project), necessary to support the flight test portion of the AF EC Test Process including the development of advanced signal sources to represent ground and airborne threats and the upgrade of existing threat simulators to maintain currency with the latest intelligence. This project is the AF portion of a coordinated tri-Service threat simulator development strategy.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program: See PE 0604735F

2. (U) FY 1994 Planned Program:
   - (U) Acquire and instrument threat systems, or develop instrumented threat simulators, as dictated by cost and availability. Continue upgrades to existing threats and threat simulators and associated instrumentation at the Electromagnetic Threat Environment (EMTE) in support of the EC Test Process. Continue incorporation of the latest intelligence information into the SADS V (Missile), SADS X, SADS XI, and SADS XI (Missile). Incorporate the latest intelligence information into simulators for threats for which real systems are not available. ($2.177M)
   - (U) Continue development of an Advanced Airborne Interceptor Simulator (AAIS) begun in FY 93 by OSD Central Test and Evaluation Investment Program (CTEIP). Conduct AF analyses of technical approaches for meeting requirements, evaluating existing simulation and actual hardware systems, preparing request for proposal and conducting source selection. ($0.963M)

3. (U) FY 1995 Planned Program:
   - (U) Acquire and instrument threat systems, or develop instrumented threat simulators, as dictated by cost and availability. Start procurement of SADS XII antenna. Continue upgrades to existing threats and threat simulators and associated instrumentation at the Electromagnetic Threat Environment (EMTE) in support of the EC Test Process. Continue

Program Element: #0604256F
PE Title: Threat Simulator Development
Project Number: 6510
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support
Date: February 1994

instrumentation and closed-loop missile simulation on foreign surface-to-air missile (SADS VM). Incorporate the latest intelligence information into simulators for threats for which real systems are not available. ($2.635M)

- (U) Continue work on the AAIS program. Award contract to develop, fabricate, integrate, and test an airborne test simulator to be completed 4Qtr FY98. ($3.566M)

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

D. (U) WORK PERFORMED BY: This project is managed by the 46th Test Wing, Eglin AFB, FL. Major contractors are Georgia Institute of Technology, Atlanta, GA; Environmental Research Institute of Michigan; Dynetics, Huntsville, AL; Sverdrup, Ft. Walton Beach, FL.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: TBD.

3. (U) COST CHANGES: TBD.

F. (U) PROGRAM DOCUMENTATION:

- (U) TAC SON 304-80, Tactical Self-Protection EW System (U), SECRET, validated 15 Jan 81.
- (U) TAF SON 304-81, Airborne ECM Simulation (U), SECRET, 4 Apr 81, validated 24 May 82.
- (U) ESC SON 03-80, USAF Red Force (CONSTANT SPUR) (U), SECRET, 3 Sep 81, Validated 16 Mar 84 to include COMFY CHALLENGE.
- (U) AFOTEC SON 01-85, Range Resources in Support of Realistic Operational Test and Evaluation, SECRET, 1 May 87.
- (U) Draft AFMC SON 001-89, Electronic Combat Digital Evaluation System (ECDES), UNCLASSIFIED.
- (U) Draft AFSC SON, Electronic Combat Integrated Test Facility (ECITF), dated 4 Apr 89.
- (U) AFOTEC/AFSC MENS 201-89, Advanced Airborne Interceptor Operational Test and Eval Capability (AAIOTC), 24 Sep 92.
- (U) AFOTEC/AFSC/SAC/AFSOC MNS 401-92, Weapon Systems Test Capability (WSTC), 12 May 92, approved 4 Sep 92.
- (U) Draft AFMC 017-91, Joint AFMC-Army-Navy Mission Need Statement for a DOD Common Modeling Architecture, UNCLASSIFIED.
- (U) AFOTEC Mission Need Statement (MNS) 001-91, Hybrid/Installed Test Simulators (HITS), UNCLASSIFIED, 29 Aug 91.

Program Element: #0604256F
PE Title: Threat Simulator Development

Project Number: 6510
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

G. (U) RELATED ACTIVITIES:
- (U) Continues FY 1992/1993 activities in PE 0604735, Range Improvements.
- (U) Navy and Army also engage in electronic combat T&E infrastructure development programs.
- (U) All USAF threat simulator programs, including portions of this project are reviewed by the CROSSBOW-S Committee and the DoD Executive Committee on Threat Simulators (EXCOM).
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ In Thousands): Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:
- (U) AAIS Initial Operational Capability. 4th Qtr FY 98

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604258F **Date:** February 1994
PE Title: Target Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #6 - Defense-Wide Mission Support

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2459 Target Payloads								
3,559*	2,575	966	4,668	5,840	6,064	6,314	Cont	TBD
3165 Full Scale Aerial Target System								
16,900*	7,477	6,610	1,191	0	0	0	0	51,622
Total								
20,459*	10,052	7,576	5,859	5,840	6,064	6,314	Cont	TBD

*Prior to FY94, efforts were funded under PE 0604211F, Advanced Aerial Targets Development. Change made to reflect consolidation of related efforts in all Services under the same PE and title.

B. (U) BRIEF DESCRIPTION OF ELEMENT: Aerial Targets are essential to ensure air-to-air weapons effectiveness and mission proficiency of our tactical systems against enemy aircraft. The overall objective is to improve air-to-air weapon system accuracy and reliability by developing aerial target systems for Air Force weapon system test and evaluation.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

(U) Project 2459, Target Payload Systems: Full-scale and subscale targets require payload subsystems for missile scoring, electronic and infrared (IR) countermeasures, and radar and IR signature augmentation. Current scoring systems provide only miss distance information. The tri-service system under development provides missile path and position relative to the target at point of closest approach, which are essential to accurately calculate the probability of kill. Radar signature augmentation provides radar

Program Element: 0604258F **Date:** February 1994
PE Title: Target Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #6 - Defense-Wide Mission Support

signatures for subscale targets representative of threat aircraft. IR signature augmentation on subscale targets provides a signature representative of threat military jet engines. Electronic and IR countermeasures (ECM & IRCM) include systems such as chaff and flare dispensers.

(U) FY 1993 Accomplishments:
- (U) - Participated in Navy source selection and EMD contract award for tri-service development of non-cooperative vector scoring (NAVS) ($2.5M)
- (U) - Completed feasibility study for economical mid scale aerial target (MSAT) concept ($0.2M)
- (U) - Completed feasibility study for target radar cross section (RCS) modification, "DREEM" (Drone RCS Electronic Enhancement Mechanism) ($0.6M)
- (U) - Began consolidation of Aerial Targets management to increase efficiency ($0.3M)

(U) FY 1994 Planned Program:
- (U) - Continue to participate in tri-service development of non-cooperative vector scoring ($1.2M)
- (U) - Initiate follow-on efforts based on results of MSAT and RCS modification studies contingent on added funding and requirements definition ($0.2M)
- (U) - Collect and compile target signature data for use in test planning ($0.4M)
- (U) - Incorporate Gulf Range Drone Control Upgrade System (GRDCUS) on MQM-107E ($0.7M)

(U) FY 1995 Planned Program:
- (U) - Continue to participate in tri-service development of NAVS ($0.4M)
- (U) - Initiate DEMVAL for RCS modification study ($0.1M)
- (U) - Continue follow-on efforts based on results of MSAT study ($0.1M)
- (U) - Collect and compile target signature data for use in test planning ($0.2M)
- (U) - Initiate radio frequency (RF) survivability efforts ($0.1M)

(U) Work Performed By: Program administered by Aeronautical Systems Center, Range and Airbase System Program Office, Aerial Targets Division, Eglin AFB FL. The DREEM study was conducted by Environmental Research Institute of Michigan (ERIM), Ann Arbor MI and Mirage Systems, Sunnyvale CA. Analytic Services Inc., Arlington VA conducted the MSAT study.

Program Element: 0604258F
PE Title: Target Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #6 - Defense-Wide Mission Support

Date: February 1994

(U) Related Activities:
(U) - PE 0305116F, Aerial Target Procurement
(U) - Formal interservice coordination through the Joint Logistics Commanders, Joint Commanders Group for Test & Evaluation, and the proposed Joint Target Oversight Council ensures that there is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.
(U) - Production funding is provided by host target system.

(U) International Cooperative Agreements: Not Applicable.

(U) Project 3165, Full Scale Aerial Target Systems: The Air Force is lead for a tri-service program for the development of the QF-4 full scale aerial target. The QF-4 is the follow-on to the QF-106 full scale target used today. The final buy of the QF-106 was in FY93 with deliveries complete in 4Qtr FY94. The first QF-4 production is scheduled for delivery in 2Qtr FY96.
Aerial Targets are essential to ensure air-to-air weapons effectiveness and mission proficiency of our tactical aircrews against enemy aircraft. Full-scale targets are fully representative of the threat, with realistic maneuvering performance, radar cross section and afterburning engine infrared (IR) signature. The overall objective is to improve air-to-air weapon system accuracy and reliability by developing aerial target systems for Air Force weapon system test and evaluation. Full-scale targets are also used to support US Army air defense test and evaluation programs such as the Divisional Air Defense follow-on program, Stinger, Patriot and Improved Hawk.

(U) FY 1993 Accomplishments:
(U) - Completed development of basic flight tests ($11.8M)
(U) -- Conducted Critical Design Review (NSP)
(U) - Test and Evaluation Support ($5.1M)
(U) -- Completed antenna pattern testing (NSP)
(U) -- Began contractor flight tests (NSP)

(U) FY 1994 Planned Program:

Program Element: 0604258F **Date:** February 1994
PE Title: Target Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #6 - Defense-Wide Mission Support

(U) - Complete development of electronic countermeasure (ECM) pod ($0.3M)
(U) - Complete development of basic flight tests ($4.3M)
  (U) -- Complete development of tri-service flight termination system (NSP)
  (U) -- Complete contractor flight tests (NSP)
  (U) -- Conduct flight readiness review (NSP)
  (U) -- Conduct preliminary software physical configuration audit (PCA) (NSP)
(U) - Test and Evaluation Support ($2.9M)
  (U) -- Begin DT&E/IOT&E at Tyndall AFB for the integrated QF-4 system (NSP)
  (U) -- Complete testing of mobile control station (NSP)

(U) FY 1995 Planned Program:
(U) - Complete development of basic system through Drone Formation Control System testing ($4.1M)
  (U) -- Conduct Production Readiness Review #2 (NSP)
  (U) -- Make production decision (exercise production option #1) (NSP)
  (U) -- Conduct final software PCA (NSP)
  (U) -- Complete EMD phase of contract (NSP)
(U) - Test and Evaluation Support ($2.5M)
  (U) -- Begin DT&E/IOT&E at White Sands Missile Range for the integrated QF-4 system (NSP)

(U) Work Performed By: Program administered by Aeronautical Systems Center, Range and Airbase System Program Office, Aerial Targets Division, Eglin AFB FL. The QF-4 contractor is Tracor Systems Division, Austin TX and Northrop, Chicago IL is the contractor for ECM payload systems.

(U) Related Activities:
(U) - PE 0305116F Aerial Target Procurement.
(U) - Interservice coordination through Joint Logistics Commanders, Joint Commanders Group for Test & Evaluation.
(U) - Formal coordination through the Multi-Service Test Investment Review Committee ensures there is no unnecessary duplication within the AF or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands):

Program Element: 0604258F
PE Title: Target Systems Development
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #6 - Defense-Wide Mission Support

Date: February 1994

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3020, Budget Activity: 4, Program Title: Target Drones								
WSC: M106QF (QF-106)								
30,425	0	0	0	0	0	0	0	90,657
WSC: M107 (MQ-107E)								
8,996	26,140	2,190	10,764	11,773	12,172	12,673	Cont	TBD
WSC: M04AQF (QF-4)								
	4,653	26,853	28,643	28,809	30,048	31,272	Cont	TBD
Spares								
1,933	657	1,448	178	3,977	4,127	4,291	Cont	TBD
Appropriation 3400, Budget Activity: 4, Program Title: Target Drones								
0	696	768	955	957	2,685	2,773	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604268F. Project Number: N/A Date: February, 1994
PE Title: Aircraft Engine Component Improvement Program (CIP) Budget Activity: #5 - EMD
Old Budget Activity: #4 - Tactical Programs

A: (U) RESOURCES ($ In Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Aircraft Engine Component Improvement Program (CIP)								
93,096	101,673	97,399	98,589	97,933	99,523	101,825	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: CIP provides critical sustaining engineering support (only source) for in-service Air Force engines to maintain flight safety (highest priority), to correct service revealed deficiencies, to improve system Operational Readiness (OR) and Reliability and Maintainability (R&M), to reduce engine Life Cycle Cost (LCC), and to keep older engines operational. Historically, aircraft systems change missions, tactics, and environments to meet changing threats throughout their lives. Numerous new problems can arise through actual use during deployment, production, and service, and CIP provides the only funds to develop fixes for these field problems. CIP starts with acceptance of the first production engine and continues over the engine's life, gradually decreasing to a minimum level (safety/depot repairs) sufficient to keep older inventory engines operational. CIP addresses usage and life not covered by engine warranty and enables the Air Force to obtain improved warranties when manufacturers incorporate CIP improvements into production engines. Since changes continue throughout a system's operational life, CIP must be maintained at a level to provide the engineering support to make changes which are essential for satisfactory system performance at affordable costs. CIP ensures continued improvements in engine R&M factors, which reduces outyear support costs. Typically, CIP efforts reduce outyear Operations and Maintenance (O&M) and spares costs by a ratio greater than 21 to 1. O&M and spares budgeting assumes a viable CIP effort is in place. Without the outyear cost avoidance provided by CIP, outyear support costs would have to be increased drastically. CIP funding is driven by field events and types/maturity of engines, not by the total engine quantity. CIP is an EMD program because the majority of the effort occurs during the development, production and deployment of operational engines.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   (U) - Continued effort to reduce air aborts, aircraft safety incidents, non-mission capable rates, scheduled and unscheduled engine removals, maintenance man hours, and overall costs. Completed 7909 test hours (6685 sea level, 1137 altitude, 87 flight test) to analyze, verify and qualify CIP tasks. Also completed 652 CIP tasks (247 redesign tasks, 321 repair development tasks, 84 analysis tasks) generating $3.1B in LCC savings. ($93,096.000)

Program Element: #0604268E. Project Number: N/A Date: February, 1994
PE Title: Aircraft Engine Component Improvement Program (CIP) Budget Activity: EMD
Old Budget Activity: #4 - Tactical Programs

(U) -Example F100 Task (F-16/F-15): Redesigned F100-PW-229 flameholder to improve commonality with all F100 models, reduce spares costs, improve durability - $ 53.0M LCC saving. ($556,000)
(U) - Example F110 Task (F-16): Redesigned #3 bearing to reduce bearing operating temperatures, increase bearing life during oil starvation - $39.5M LCC savings. ($200,000)
(U) - Example F101 Task (B-1): Completed additional mission/engine analysis and implementation/feasibility studies in support of Lancer 101 activity to address engine failures - F101 #1 safety concern. ($1,000,000)

2. (U) FY 1994 Planned Program:
(U) - Continue effort to increase engine operability and supportability, reduce air aborts, aircraft safety incidents, non-mission capable rates, scheduled and unscheduled engine removals, maintenance man hours, and overall costs. Program will include 7744 test hours (6532 sea level, 1212 altitude), to analyze, verify and qualify CIP tasks.
(U) - There will be 637 CIP tasks (237 redesign tasks, 317 repair development tasks, 83 analysis tasks) generating $2.7B in LCC savings. (Total program $101,673,000).
(U) - A typical task is the F110-GE-100 Digital Engine Control Flight testing. Expected completion in FY 94. This task is budgeted at $2,250,000 within the total program cost shown above.

3. (U) FY 1995 Planned Program:
(U) - Continue effort to increase engine operability and supportability, reduce air aborts, aircraft safety incidents, non-mission capable rates, scheduled and unscheduled engine removals, maintenance man hours, and overall costs.
(U) - Program will include 7544 test hours (6337 sea level, 1207 altitude), to analyze, verify and qualify CIP tasks.
(U) - 621 CIP tasks (230 redesign tasks, 309 repair development tasks, 82 analysis tasks) generating $2.5B in LCC savings. (Total program $97,399,000)

4. (U) Program to Completion:
(U) - Continue effort to increase engine operability and supportability, reduce air aborts, aircraft safety incidents, non-mission capable rates, scheduled and unscheduled engine removals, maintenance man hours, and overall costs.
(U) - This is a continuing program.

D. (U) WORK PERFORMED BY: The Subsystem System Program Office (SPO) at Aeronautical Systems Center (ASC), Wright-Patterson AFB OH manages the overall program. Engine CIPs are managed at ASC, and at San Antonio and Oklahoma City Air Logistics Centers. Arnold Engineering Development Center, Tullahoma TN and the Air Force Flight Test Center, Edwards AFB CA conduct in-house test and evaluation efforts. Contractors (and engines) include Allison Gas Turbine, Indianapolis IN (T56, TF41); General Electric Company, Evendale OH (J79, TF39, F101, F110) and Lynn MA (J85, TF34, T64, T58, T700); Allied Signal (Garrett), Torrance CA and Phoenix AZ (T76, Auxiliary Power Units); Pratt and Whitney, Canada (T400) and West Palm Beach FL (F100, J57, TF30, TF33); Teledyne, Toledo OH (J69); and Williams International, Walled Lake MI (F107, F112).

Program Element: #0604268F. Project Number: N/A Date: February, 1994
PE Title: Aircraft Engine Component Improvement Program (CIP) Budget Activity: EMD
Old Budget Activity: #4 - Tactical Programs

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: Lower priority tasks deferred to following year. The Engine Advisory Group assesses the program and budget annually and reviews progress regularly to reconcile budget reductions, shifting priorities and newly identified, urgent problems.

3. (U) COST CHANGES: Funding for FY95/96 is reduced $1.7M and $0.7M respectively from the previous Descriptive Summary. The remaining funds sustain known flight safety improvement tasks but decrease activity on some modifications that had been planned to reduce maintenance costs and improve reliability.

F. (U) PROGRAM DOCUMENTATION: Not applicable.

G. (U) RELATED ACTIVITIES:
(U) PE # 0603202F, Aircraft Propulsion Subsystem Integration, provides fan and low pressure turbine technology
(U) PE # 0603216F, Advanced Turbine Engine Gas Generator, provides compressor, combustor, and high pressure turbine technology
(U) PE # 0603218F, Engine Model Derivative Program, provides additional component and engine test data
(U) PE # 0708011F, Industrial Preparedness Program, provides materials processing and component fabrication demonstration
(U) PEs # 0604268A /#0604268N, Army/Navy Aircraft Engine CIPs
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS: CIP is the only source of sustaining engineering for engines. Retrofits developed under CIP are funded in the Weapons System Programs. Repair procedures and techniques developed in CIP do not require specific funding but can be implemented by the depot or in the field immediately. Some parts developed under CIP may be funded by the depot as preferred spares.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1995 BIENNIAL RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

A. (U) RESOURCES ($ In Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	Total Complete	Total Program
2272	ALE-47 COUNTERMEASURES DISPENSER SYSTEM							
3,725	2,370	0	0	0	0	0	0	34,186
2462	COMPASS CALL							
32,097	11,087	4,898	1,582	3,581	2,519	1,602	CONT	TBD
3108	AIRLIFT DEFENSIVE SYSTEMS							
4,681	190	190	0	0	0	0	0	22,924
4076	ON-BOARD ELECTRONIC WARFARE SIMULATOR							
7,774	14,162	0	0	0	0	0	0	30,377
3660	AIR FORCE ELECTRONIC COMBAT OFFICE (AFECO)							
955	0	0	0	0	0	0	0	2,081
5618	F-15 PROTECTIVE SYSTEMS							
18,304	9,194	0	0	0	0	0	0	326,899
1011	JOINT SERVICE ELECTRONIC COMBAT SYSTEMS TESTER (JSECST)							
0	1,413	3,508	11,370	11,625	2,141	0	0	30,057
3896	ADVANCED STRATEGIC AND TACTICAL INFRARED EXPENDABLES							
9,766	8,594	11,461	9,097	2,601	0	0	0	54,819
4077	ADVANCED MISSILE WARNING							
11,261	13,440	18,790	47,536	93,024	64,583	16,913	CONT	TBD
2066	EF-111A SYSTEM IMPROVEMENT PROGRAM (SIP)							
56,933	57,025	49,927	50,176	42,176	21,275	10,450	CONT	TBD
Total								
145,496	117,475	88,774	119,761	153,007	90,518	28,965	CONT	TBD

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element consolidates engineering development efforts related to Air Force Electronic Warfare (EW) requirements. The EW Development Program objective is to transition advanced development technologies to installed operational capabilities via Engineering and Manufacturing Development (EMD) programs. (Technology base/advanced development efforts are funded in PE-0603270F, Electronic Combat Technology.)

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 2272, ALE-47 Countermeasures Dispenser System (CMDS):
This project develops the ALE-47 CMDS system for F-16 Block 40 and 50 retrofit installations. The ALE-47 CMDS is a joint Air Force (lead), Navy, and Army program to develop an interactive, programmable expendables dispenser for the F-16 and numerous Navy & Army aircraft. The ALE-47 provides manual, semi-automatic, and automatic dispensing of expendables. The semi-automatic and automatic modes use radar warning receiver (RWR) information, along with aircraft position and speed to optimize the type, quantity, and speed of the dispense. The ALE-47 allows use of multiple expendable types, increases number of manual programs, has faster dispense rates, and has growth provisions for a missile warning system interface. RDT&E funding is required to provide for software enhancements to resolve deficiencies discovered during flight test ($1.8M), to develop depot support capabilities ($2.5M), and to provide for support contracting and SPO operations ($1.9M).

(U) FY 1993 Accomplishments:
(U) - Depot Support Development Obligations. (Aug 93, $2.6M)
(U) - System Software Enhancements from Flight Test. (Nov 93, $1.1M)

(U) FY 1994 Plans:
(U) - Complete Depot Support Development. (Sep 94, $0.77M)
(U) - System Software Enhancements. (Dec 93, $1.6M)

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
Date: February 1994
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) FY 1995 Plans:
(U) - Not Applicable

(U) Work Performed By: Air Force Materiel Command, Aeronautical Systems Center, Wright-Patterson AFB OH, manages the program. Tracor Inc., Austin TX, has a firm fixed price contract to accomplish the ALE-47 CMDS EMD and two fixed price incentive fee options.

(U) Related Activities:
(U) - PE 0207133F, F-16 Squadrons.
(U) - PE 0604270N, project number W0638, Electronic Warfare Development.
(U) - There is no unnecessary duplication of this effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	Total Complete	Total Program
Appropriation Aircraft Procurement, Budget Activity #4-Tactical Programs, Program Title F-16 Squadrons								
0	2,500	0	0	0	0	0	0	14,800
Appropriation Aircraft Procurement, Budget Activity #4-Tactical Programs, Program Title F-16 Modifications								
12,700	11,800	11,100	10,700	7,800	8,900	13,500	12,400	

FY 1995 BIENNIAL RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) International Cooperative Agreements: International Agreement Approval Document for Korea, dated 11 Sep 92: 120 Systems for F-16 installations. International Agreement Approval Document for Taiwan is in coordination: 150 Systems for F-16 installation.

2. (U) Project 2462, Compass Call

COMPASS CALL is an EC-130H stand-off jamming platform used to disrupt enemy air defenses and ground operations. COMPASS CALL performs its mission by countering air-air, ground-air, SAM and army (e.g., artillery) C3 voice links. The EC-130H complements both present and future air, ground and sea based systems to provide theater commanders with a coordinated jamming capability. This program element provides a continuing technology program to keep the EC-130H current with the rapidly evolving threat.

(U) FY 1993 Accomplishments:

(U) - Closed out P-34 EMD contract (No cost)
(U) - Continue P-38 EMD ($15.85M)
(U) -- Continued development of High Band Subsystem (HBS)
(U) -- Begin development of High Band Exciter (HBE)
- Awarded Restructured contract, Tactical Radio Acquisition and Countermeasures System (TRACS) to provide Digital acquisition receiver, and interference cancellation development within reduced funding profile ($8.82M)
(U) -- Revised MOA with SPM developing agency to expand capabilities.
(U) -- Conducted successful demonstration of SPM against 1st target radio system
(U) -- Submitted follow-on PID on TRACS test program

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Awarded ECP and continued development of Jam Management/Situational Awareness Subsystem ($5.46M)
(U) - Awarded Foreign military Equipment Exploitation task orders ($.7M)
(U) - Conducted flight and acceptance testing of Low Band DF subsystem ($.273M)
(U) - System Support Contract, time and materials ($.924M)

(U) FY 1994 Plans:

(U) - Continue development of HBE ($5.436M)
(U) - Integrate HBS into system support facility($1.361M)
(U) - Continue TRACS EMD ($2.62M)
-- Continue countermeasures development
(U) -- Conduct ground proof-of-concept with AFFTC relating to future SAR program activities
(U) -- Conduct system support facility (SSF) integration testing of digital acquisition receiver and interference cancellation subsystems.
(U) -- Conduct readiness demonstration
(U) -- Monitor MOA approval process
(U) -- Concept Exploration for JCS Combat MNS
(U) - Integrate Jam Management/Situational Awareness Subsystem into system support facility ($1.17M)
(U) - Begin new time and materials system support contract ($.5M)
(U) - Close out low band DF subsystem EMD contract (-0- No cost extension)

(U) FY 1995 Plans:

(U) - Complete integration of HBS into system support facility ($2.878M)
(U) -- CONUS combined flight test for HBS and Jam Management/Situational Awareness Subsystems

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
Date: February 1994
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) -- OCONUS combined Flight Test for HBS and Jam Management/Situational Awareness Subsystems
(U) - Continue TRACS EMD ($2.02M)
(U)-- SSF test of countermeasures capability
(U)-- Flight test of countermeasures capability
(U) -- Update MOA with SPM developing agency

(U) Work Performed By: Air Force Material Command, Wright-Patterson AFB, OH, manages the program to develop improvements and modifications to COMPASS CALL. The primary contractors include: Lockheed Aircraft Service Company, Ontario, CA; Lockheed Sanders, Nashua, NH; Magnavox, Ft Wayne, IN; and GTE, Mountain View, CA.

(U) Related Activities:

(U) - PE 02072530, COMPASS CALL procures the system hardware
(U) - Cooperation with the Army's PEO for Signal Warfare provides for technology transfer and prevents duplicative R&D efforts
- Member of a working group to facilitate technology transfer within DOD
(U) - There is no unnecessary duplication of this effort within the Air Force or the Department of Defense

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	Total Complete	Total Program
Appropriation Aircraft Procurement, Budget Activity Tactical Programs, Program Title Compass Call								
91,876	67,954	72,759	19,005	24,063	29,553	18,936	0	

(U) International Cooperative Agreements: Not applicable

3. (U) PROJECT 3108, Airlift Defensive Systems:

Airlift Defensive Systems will provide defensive systems, using missile warning receiver and countermeasure dispenser systems, to protect airlift aircraft from man-portable, hand-held surface-to-air infrared guided missile threats. This project provides for the development and prototype of a common defensive system (AAR-47 Missile Warning Receiver; ALE-40 or 47 Countermeasures Dispenser) for tactical and strategic aircraft, especially the C-130, C-141 and C-5. This is a design-to-cost effort, utilizing to the maximum extent possible the engineering efforts of Project Snowstorm. Concepts will be explored for defensive systems against advanced infrared threats for all AMC aircraft.

(U) FY 1993 Accomplishments:

(U) - Completed design review of C-141 and C-5 and began procurement process.
(U) - Began kitproof and installation of C-141.
(U) - Initiated ALM-262A Countermeasures Test Set Upgrade. ($.075M)
(U) - Initiated test of low infrared coatings as a countermeasure against surface-to-air infrared guided missiles. ($.192M)
(U) - Initiated Evaluation of ALE-47 trial installations and incorporated engineering changes in the aircraft. ($.291M)
(U) - Initiated definition of needs for advanced IRCM. ($.283M)
(U) - Support for classified program ($3.84M)

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) FY 1994 Plans:
- (U) - Begin procuring ALE-47 for ADS aircraft
- (U) - Complete kitproff of C-141
- (U) - Evaluate requirements for AAR-47 changes. ($.170M)
- (U) - Start ALE-47 installation
- (U) - Begin kitproof and installation of C-5
- (U) - Continue definition of needs for advanced IRCM. ($.02M)

(U) FY 1995 Plans:
- (U) - Complete kitproof and installation of C-5. ($.170M)
- (U) - Continue ALE-47 installation
- (U) - Complete definition of needs for advanced IRCM. ($.02M)

(U) Work Performed By: The Airlift Defensive Systems (ADS) Program Manager is the Warner-Robins-ALC, Robins AFB GA for RDT&E. Based on the IWSM Plan, in FY93 the management of the acquisition and installation of ADS equipment was split to the respective aircraft system program directors. C-130 contract installation teams are from Lockheed Support Systems, Arlington, TX. C-141 ADS installations have been made under contract to Rockwell Aircraft Modification Center, Shreveport, LA. C-5 ADS installations were made under contract to Lockheed-Marietta, Marietta, GA.

(U) Related Activities:
- (U) - PE-0401330F and PE064231F, C-17 Program
- (U) - PE-0401115F, C-130 Airlift Squadrons
- (U) - PE-0401118F, C-141 Airlift Squadrons
- (U) - PE-0401119F, C-5 Airlift Squadrons
- (U) - PE-0404011F, Special Operations Forces

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FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F **Date:** February 1994
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) - There is no unnecessary duplication of this effort within the Air Force or the Department of Defense

(U) Other Appropriation Funds ($ In Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	Total Complete	Total Program
Appropriation Aircraft Procurement, Budget Activity #5 EMD, Program Title Airlift Defensive Systems								
15,100	18,000	19,100	11,300	3,400	0.4000	0	0	

(U) International Cooperative Agreements: Not Applicable.

4. (U) Project 4076, On-Board Electronic Warfare Simulator (OBEWS):
This project develops the On-Board Electronic Warfare Simulator (OBEWS). OBEWS will provide on-board electronic warfare (EW) continuation training for F-16 and F-15E pilots by supplementing or completely simulating their outside radar signal environment with digital signals. OBEWS will provide home base continuation training to complement Combat Air Force pilots' comprehensive training on electronic combat (EC) ranges which occurs once every 1-2 years. A pod-mounted OBEWS proof-of-concept prototype was developed and flight tested at Eglin AFB in 1989 to evaluate the operational effectiveness and suitability of OBEWS as an EC training device. The follow-on Engineering and Manufacturing Development (EMD) system will be internally mounted and work through each platform's radar warning receiver (RWR). For the F-16, ALR-56M and ALR-69 RWR equipped aircraft will be installed with OBEWS. For the F-15E, OBEWS will work through the ALR-56C RWR. Software developed under the OBEWS prototype contract will be supplied as government furnished media to the EMD contractor(s). OBEWS mission planning and debriefing will be accomplished on the Air Force Mission Support System (AFMSS). OBEWS software is not hardware dependent and can be ported to hadware other than that specifically developed for OBEWS. Therefore, FY94 efforts will be directed toward completing OBEWS EMD development, with emphasis on

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

software, through factory testing ($1.2M); designing the ALR-56M and ALR-69 software modifications for OBEWS ($2.2M); and terminating OBEWS development contracts ($1.0M).

(U) FY 1993 Accomplishments:
(U) - -Continued OBEWS EMD. (Sep 93, $5.2M)
(U) - -Begin OBEWS integration into F-16C/D aircraft. (Sep 93, $0.8M)
(U) - -Continue planning for OBEWS integration into F-15E aircraft. (Sep 93, $1.8M)

(U) FY 1994 Plans:
(U) - Develop OBEWS design through factory testing. (Sep 94, $1.2M)
(U) - Continue OBEWS integration into F-16C/D aircraft. (Sep 94, $0.5M)
(U) - Determine system software modification needs for ALR-56M RWR. and ALR-69 RWR system software for OBEWS . (Sep 94, $2.2M)
(U) - Terminate Contracts and Stop Work. (Sep 94, $1.0M)
(NOTE: OSD directed Joint Tactical Electronic Warfare Study $9.262M)

(U) FY 1995 Plans:
(U) - Not applicable. No RDT&E or Production Funding.

(U) Work Performed By: The program is managed by the Range and Air Base System Program Office, Aeronautical Systems Center (ASC/YO) at Eglin AFB FL. Lockheed Sanders Inc., Nashua NH, has a Cost Plus Incentive Fee contract to accomplish OBEWS EMD with two Firm Fixed Price production options.

(U) Related Activities:
(U) - PE 0207133F, F-16 Squadrons.
(U) - PE 0207134F, F-15E Squadrons.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F **Date:** February 1994
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) - PE 0208006F, Mission Planning Systems.
(U) - PE 0207597F, Training - Tactical Air Force.
(U) - There is no unnecessary duplication of this effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands): None.

(U) International Cooperative Agreements: Not applicable.

5. (U) Project 3660, Air Force Electronic Combat Office (AFECO):
The purpose of the AFECO is to focus USAF Combat acquisition and upgrade programs; integrate the planning, development, production, life cycle support and modification of USAF electronic combat (EC) systems and to ensure the EC programs are technically and fiscally executable to meet the user's needs and support implementation of the EC Test Process. AFECO activities conclude in FY 1993.

(U) FY 1993 Accomplishments:
- (U) - Continue support to EC Program Offices, and to users in developing EC requirements
- (U) - Terminated EW database implementation, review and upgrade due to lack of funding
- (U) - Supported J-MASS Architecture for all EC modeling
- (U) - Completed studies and Analysis for:
  - (U) -- SOF/Airlift Defensive Systems
  - (U) -- Tactical Systems Roadmap
  - (U) -- Air Combat Command's EC Planning Guide
  - (U) -- B-1B Missile Warning System requirements
- (U) - Expanded efforts with Wright Lab and industry by hosting RF countermeasures conference
- (U) - Supported HQ USAF/XOR in developing USAF EC Roadmap
- (U) - Designated chair of EC Technology Planning Integrated Product Team for AFMC

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FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
Date: February 1994
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) FY 1994 Plans:
(U) - Not applicable

(U) FY 1995 Plans:
(U) - Not Applicable

(U) Work Performed By: Air Force Materiel Command, Aeronautical Systems Center, Wright-Patterson AFB OH, manages the program.

(U) Related Activities:
(U) - Not applicable

(U) Other Appropriation Funds ($ In Thousands):
(U) - Not applicable

(U) International Cooperative Agreements:
(U) - Not applicable

(U) Related Activities:
(U) - Not applicable

(U) Other Appropriation Funds ($ In Thousands):
(U) - Not applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

6. (U) Project 5618, F-15 Protective Systems:
This project develops the Tactical Electronic Warfare System (TEWS) improvements and upgrades to the F-15 self-protection suite. The F-15 TEWS consists of the ALR-56C Radar Warning Receiver (RWR), the ALQ-135 Internal Countermeasures System (ICS), the ALQ-128 Electronic Warfare Warning System, and the ALE-45 Countermeasures Dispenser (CMD). Hardware development of the ALR-56C, ALQ-135 Band 3, ALE-45, and ALQ-128 is complete with initial software loads tested and fielded.

(U) FY 1993 Accomplishments:
(U) - Completed instrumentation of an F-15E to support flight test. (Oct 92, $1.3M)
(U) - Continued development of TEWS integrated baseline software. ($0.8M)
(U) - Conducted F-15C/E ALR-56C/ALQ-135 DT&E Flight Test. (Sep 93, $16.2M)

(U) FY 1994 Plans:
(U) - Complete development and test of ALR-56C/ALQ-135 Block Update I. (Jul 94, $7.8M)
(U) - Complete development and test of ALQ-135 Phase II. (Oct 94, $0.5M)
(U) - Complete development of RF Compatibility Analysis. (Dec 94, $0.9M)

(U) FY 1995 Plans:
(U) - Not Applicable

(U) Work Performed By: Air Force Materiel Command, Aeronautical Systems Center, F-15 Program Office, Wright-Patterson AFB OH, is the system integrator. Loral, Yonkers NY, is the prime for the ALR-56C. Northrop, Rolling Meadows IL, is the prime for the ALQ-135. Tracor, Austin TX, is the prime for the ALE-45.

(U) Related Activities:

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FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - PE 0207130F, F-15A/D Squadrons.
(U) - PE 0207134F, F-15E Squadrons.
(U) - There is no unnecessary duplication of this effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
Appropriation Aircraft Procurement, Budget Activity #4 Tactical Programs, Program Title F-15A/D Squadrons								
219,300	205,900	171,700	1,300	0	0	0	0	

(U) International Cooperative Agreements: A Letter of Agreement (LOA) was signed on 5 May 93 with the Royal Saudi Air Force (RSAF) to acquire Peace Sun IX (F-15S) aircraft. They have committed $196.9M for TEWS as an avionics component of this aircraft. The F-15 prime contractor, McDonnell Douglas Aerospace (MDA), along with each contractor mentioned above are involved. There were no financial commitments required of the US contractors. There is currently no associated DoD funding. The LOA includes a requirement for low-band jammer coverage (ALQ-135, Band 1.5). The Air Force has not funded flight test nor production of Band 1.5.

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FY1995 RDT&E DESCRIPTIVE SUMMARY (U)

Program Element: #0604270F
PE Title: Electronic Warfare Development
Project Number: 1011
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4 Tactical Programs
Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	Total Complete	Total Program
1011 Joint Service Electronic Combat Systems Tester (JSECST)								
0	1,413	3,508	11,370	11,625	2,141	0	0	30,057

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES :
The JSECST will fill both an Air Force and Navy operational requirement for a small, adaptable, and highly mobile tester capable of verifying the system level performance of installed electronic countermeasures systems. Present maintenance concepts rely on the built-in-test (BIT) capabilities of the line replaceable units (LRUs) to verify system performance. This method fails to detect failures in LRU interfaces and installed aircraft (Group A) hardware. Particular emphasis will be placed on size and weight since the test set must deploy with the operational unit. JSECST is an FY 1994 new start.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS :

1. (U) FY 1993 Program:
   - (U) Finalized Joint Mission Need Statement

2. (U) FY 1994 Planned Program:
   - (U) Finalize Operational Requirements Document (ORD) ($0)
   - (U) Develop flightline test set concept of operations (CONOPS) ($0)
   - (U) Conduct technical assessment and cost benefit analysis (CBA) of potential solutions: ($1.2M)
   - (U) Establish formal program cost estimates based on CBA ($0.2)

FY1995 RDT&E DESCRIPTIVE SUMMARY (U)

Program Element: #0604270F
PE Title: Electronic Warfare Development
Project Number: 1011
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4 Tactical Programs
Date: February 1994

- (U) Establish Air Force and Navy program offices following successful Milestone I decision ($0)
- (U) Prepare for concept Demonstration and Validation (DEM/VAL) ($0)

3. (U) FY 1995 Planned Program:
   - (U) Release draft RFP for prototype development ($0)
   - (U) Award DEM/VAL contracts for prototypes of new or modified systems ($1.9M)
   - (U) Start Test Program Set (TPS) development ($900K)
   - (U) Start DT&E of DEM/VAL hardware and software ($700K)

4. (U) Program To Completion:
   - (U) This is a continuing program
   - (U) Continue DT&E of DEM/VAL hardware and software ($1.5M)
   - (U) Prepare for Engineering and Manufacturing Development (EMD) ($9.3M)
   - (U) Completion of EMD and progression into production anticipated in FY 1997
   - (U) Development of aircraft peculiar TPS will continue through FY 1998

D. (U) Work Performed By: Air Force Materiel Command, Aeronautical Systems Center, Wright-Patterson AFB, OH, and Naval Air Warfare Center, Aircraft Division, Lakehurst, NJ, will manage the program. The contractor is yet to be determined.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) TECHNICAL CHANGES: Not Applicable

2. (U) SCHEDULE CHANGES: Program direction was delayed to coincide with programmed funding (FY 1994 New Start). As a result, activities planned for FY 1993 were not conducted and a one year slip in all programmed events occured. Assistant

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FY1995 RDT&E DESCRIPTIVE SUMMARY (U)

Program Element: #0604270F
PE Title: Electronic Warfare Development

Project Number: 1011
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4 Tactical Programs

Date: February 1994

Secretary of the Air Force for Acquisition (SAF/AQ) decision to proceed with Concept Exploration and DEM/VAL rather than immediate progression into EMD changed program planning for FY 1994 and beyond to allow for the extended activities.

3. (U) COST CHANGES: Not Applicable

F. PROGRAM DOCUMENTATION:

- JMNS 3/93

G. (U) RELATED ACTIVITIES:

- This is a joint USAF/Navy program in which USAF is lead service
- Navy funding is in PE 0604270N
- There is no unnecessary duplication of effort within the Air Force of the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	Total Complete	Total Program
Appropriation 3010, Budget Activity #4 Tactical Programs, Program Title Common Electronic Countermeasures Equipment								
0	0	0	0	5,180	12,326	13,392	0	

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

FY1995 RDT&E DESCRIPTIVE SUMMARY (U)

Program Element: #0604270F
PE Title: Electronic Warfare Development
Project Number: 1011
Date: February 1994
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4 Tactical Programs

J. (U) MILESTONE SCHEDULE:

1. (U) Milestone 0	1QFY 94
2. (U) EMD Phase	4QFY 96
3. (U) Production	3QFY 97

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: Electronic Warfare Development
Project Number: 3896
Budget Activity : #5 Engineering Manufacturing Development
Old Budget Activity: #4 Tactical Programs
Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3896 Advanced Strategic and Tactical Infrared Expendables (ASTE)								
9,766	8,594	11,461	9,097	2,601	0	0		54,819

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This tri-service program develops advanced infrared (IR) expendable decoy countermeasures (CM) to provide combat, mobility and special operations aircraft increased survivability against the modern IR missile threat. The Air Force is the lead service, but theNavy will also use the decoys that are developed through ASTE. These new IR decoys will provide increased effectiveness against IR missiles having embedded counter-countermeasures (CCM), while maintaining or supplementing current capabilities against non-CCM equipped missiles. A secondary program objective is to expand the interservice commonality of IR decoys. The current strategy is to conduct a demonstration and validation (Dem/Val) program to: 1) determine the viability of countermeasures techniques by evaluating a variety of prototype expendables, 2) gauge the capability of the technology base to support near-term solutions, 3) prepare for Engineering and Manufacturing Development (EMD) of the most promising concepts. This program is also developing and using an advanced IR modeling & simulation system with emulation level threat models. The modeling system is being employed to examine specific countermeasure techniques and determine decoy performance requirements needed to protect the user identified platforms. EMD is planned to begin FY94 with the objective to field first priority decoys in FY96.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Completed fabrication, ground testing and flight testing of 13 prototype IRCM decoys ($5.9 M)
   - (U) Redesigned B-1B decoy and passed all safety testing ($0.5M)
   - (U) Fielded advanced IR engagement modeling systems ($1.385M)

Program Element: #0604270F
PE Title: Electronic Warfare Development
Project Number: 653896
Budget Activity : #5 Engineering Manufacturing Development
Old Budget Activity: #4 Tactical Programs
Date: February 1994

- (U) Completed digital threat models as well as verification and correlation ($0.55M)
- (U) Initiated development of EMD acquisition strategy and documentation ($0)
- (U) Coordinated with Army and Navy to establish tri-service acquisition plan ($0)
- (U) Initiated live fire missile tests against advanced IR decoys ($0.88M)
- (U) Initiate flight testing of B-1 decoy ($0.6M)

2. (U) FY 1994 Planned Program:
   - (U) Complete live fire missile tests against advanced IR decoys ($0.15M)
   - (U) Completed flight testing of the advanced B-1B decoy ($0)
   - (U) Complete assessment of IR decoy requirements for each identified user platform ($0.5M)
   - (U) Achieve go ahead for EMD (Milestone II); release RFP; conduct EMD contract source selection ($4.3M)
   - (U) Initiate in-house development efforts with Naval Surface Warfare Center - Crane Division ($1.20M)
   - (U) Support development of IR expendables for "low and slow aircraft" by Army Advanced IR Countermeasure Munitions (AIRCMM) program ($1.0M)
   - (U) Continue engagement modeling and analysis in support of EMD ($0.9M)
   - (U) Add missile warning, jammers, and new threats to IR modeling system ($0.5M)

3. (U) FY 1995 Planned Program:
   - (U) Continue in-house development efforts with Naval Surface Warfare Center - Crane Division ($1.2M)
   - (U) Award and execute EMD contract(s) for advanced decoy development ($4.5M)
   - (U) Conduct early ground and safety of flight testing ($1.1M)
   - (U) Initiate production planning for advanced IR decoys ($0.5M)
   - (U) Complete DT&E test planning ($0.5M)
   - (U) Coordinate with Army on development of IR expendables for "low and slow aircraft" through AIRCMM program ($0)
   - (U) Continue engagement modeling and analysis in support of EMD ($1.2M)
   - (U) Continue improvement of IR engagement modeling system ($0.5M)
   - (U) Fabricate assets for and initiate DT&E testing of advanced decoys ($2.0M)

Program Element: #0604270F
PE Title: Electronic Warfare Development

Project Number: 653896
Budget Activity : #5 Engineering Manufacturing Development
Old Budget Activity: #4 Tactical Programs

Date: February 1994

4. (U) Program to Completion: Complete design and fabrication of EMD assets, complete DT&E/IOT&E, and prepare acquisition documentation for production decision (Milestone III) ($11.7M)

D. (U) WORK PERFORMED BY: Air Force Materiel Command, Aeronautical Systems Center, Electronic Combat System Program Office, Wright-Patterson AFB OH, has overall program management responsibility; Electronic Warfare Division, Avionics Laboratory, Wright Laboratory, Wright-Patterson AFB OH, provides technical expertise on development of the IR modeling and analysis tools and related advanced IRCM projects. Naval Surface Warfare Center, Crane IN, is supporting advanced development of prototype designs and providing technical assistance during technology demonstration ground and flight testing. The Army's Advanced Infrared Countermeasure Munitions System Program Office, Picatinny Arsenal, NJ is developing decoys for slow and low-flying aircraft. Five contractors conducted advanced development and provided Dem/Val prototypes for testing. They are: Tracor Aerospace, San Ramon CA; Thiokol Corp, Brigham City UT; Lockheed Sanders, Inc, Nashua NH; Alloy Surfaces Co, Wilmington DE; and Loral EOS, Inc, Pasadena CA.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.

2. (U) SCHEDULE CHANGES: EMD Milestone delay until Jun 94 due to delays in engagement and threat modeling caused by problems with threat exploitation. Slip also caused by delayed completion of tri-command Operational Requirements Document (ORD) from the using commands. Delayed EMD start will delay first article delivery until late FY 96 for the highest priority flares.

3. (U) COST CHANGES: $500K reprogrammed in FY 93 to test redesigned B-1 decoy later than and separate from other flares.

F. PROGRAM DOCUMENTATION:
- (U) TAF 323-88, SON for Advanced Infrared Countermeasure for TAF Aircraft, 6 Sep 89 (S/NF)
- (U) AFSOC MNS 001-91, Improved Infrared Countermeasures, 21 Aug 91 (S/NF)

Program Element: #0604270F
PE Title: Electronic Warfare Development
Project Number: 653896
Budget Activity : #5 Engineering Manufacturing Development
Old Budget Activity: #4 Tactical Programs
Date: February 1994

- (U) Multi-Command ORD (ACC, AMC, AFSOC), second draft, 8 Apr 93

G. RELATED ACTIVITIES:
- (U) PE 0604226F, B-1B Conventional Upgrade Program
- (U) PE 0603270F, Electronic Combat Technology
- (U) PE 0603270N, Electronic Combat Technology
- (U) Joint Coordinating Group (JCG)-EW and JCG-Aircraft Survivability coordinate IRCM work and threat exploitation
- (U) There is no unnecessary duplication of this effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): $920K from WRM-Ammunition, PE 28030F (Appn 3080) was used in FY 93 to fund a limited production run of special material decoy (SMD) flares for an urgent requirement for C-130s in Bosnia.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: The Program Office has initiated dialogue with the Royal Air Force (UK), which is conducting a similar advanced decoy program. No formal relationship exists at this time.

J. (U) MILESTONE SCHEDULE:

1. (U) Milestone II	June 1994
2. (U) EMD Phase	FY 94 - FY 97
3. (U) Production Deliveries (first priority decoys)	Late 1996

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604270F
PE Title: Electronic Warfare Development

Project Number: 4077
Budget Activity : #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: Advanced Missile Warning (AMW)

PHOTO NOT AVAILABLE

Program Element: 0604270F
PE Title: Electronic Warfare Development

Project Number: 4077
Budget Activity : #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

POPULAR NAME: Advanced Missile Warning/Missile Approach Warning

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones		COEA 2nd Quarter	Milestone II 1st Quarter			Milestone III 1st Quarter		
Engineering Milestones		Pod & Internal Integration study complete 4th Qt.		PDR 1st Quarter CDR 3rd Quarter				
T&E Milestones		Pod & Internal Integration Demo complete 4th Qt.			DT&E and OT&E Flight tests	OT&E Flight Tests complete 1st Quarter		
Contract Milestones			AMW System EMD CA 3rd Quarter	AMW Integration CAs 1st & 2nd Quarter		AMW Production & Installation CAs 3rd Quarter		Follow-on Production & Installation Awards
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**F 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	9,836	5,740	16,290	35,796	32,324	33,853	13,683	147,522 (TBD)
Support Contract	1,060	3,556	1,510	1,440	1,200	1,230	1,280	11,276 (TBD)
In-House Contract	0	3,200	330	9,300	54,500	27,500	1,200	96,030 (TBD)
GFE/Other	365	944	660	1,000	5,000	2,000	750	10,719 (TBD)
Total	11,261	13,440	18,790	47,536	93,024	64,583	16,913	265.547

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Program Element: 0604270F
PE Title: Electronic Warfare Development
Project Number: 4077
Date: February 1994
Budget Activity : #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Missile warning systems are required to effectively reduce combat aircraft attrition within mission areas that contain threats of increasing complexity and numbers. This project will integrate a common missile warning system (MWS) into current generation Air Force, Navy, and Marine Corps fighter aircraft. Missile warning for next generation aircraft (F-22) is funded in the F-22 development program. Pre-Engineering and Manufacturing development (EMD) activities are focusing on integration and demonstration of mature technologies (both passive and active) to meet operational requirements for missile warning to counter the post-2000 year missile threat. Without this system, survivability of current generation tactical fighter aircraft will decrease due to improvements in threat missile systems (i.e., advanced electro-optics, infrared and radio frequency missile seekers, and the proliferation of existing threat systems). Internal installation is planned for the F-16 and F-15 aircraft. An Electronic Attack (EA) pod mechanization system is also a candidate for F-111, A-10, and any other aircraft capable of carrying the EA pod. In addition, efforts to finalize a common Operational Requirements Document (ORD) are being taken with the Navy to include requirements for internally installed MWS on the F-14, F-18, and AV-8B aircraft.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - Major Contracts ($9,836 K)
     - (U) Conducted flight demonstrations on ALQ-131 AWC demonstration pod
     - (U) Completed active system integration in both ALQ-131 and -184 EA pods
     - (U) Completed pod integration studies
     - (U) Completed force package I/II operational effectiveness modeling and simulation
     - (U) Completed laboratory testing on integrated EA pods with active MWS
     - (U) Began internal integration studies/demonstrations
   - Support Contracts ($1,060 K)
     - (U) Requirements analysis support
     - (U) Program support
   - GFE/Other ($ 365 K)
     - (U) GFE to support EA pod integration activities and flight demonstrations
     - (U) SPO operations

Program Element: 0604270F
PE Title: Electronic Warfare Development
Project Number: 4077
Budget Activity : # 5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) Major Contracts ($5,740 K)
     - (U) Complete passive system integration in both ALQ-131 and -184 EA pods
     - (U) Complete laboratory testing on integrated EA pods with passive MWS
     - (U) Demonstrate feasibility of internal integration for selected aircraft
     - (U) Complete aircraft integration analysis and integration activities for both active and passive technologies
     - (U) Complete final cost and operational effectiveness analysis (COEA)
   - (U) Support Contracts ($3,556 K)
     - (U) Conduct MWS risk reduction efforts
     - (U) Prepare Milestone II documentation
     - (U) Prepare for EMD phase
     - (U) Program support
   - (U) In-House Contracts ($3,200 K)
     - (U) Complete EA pod and internal flight demonstrations and data collection
     - (U) Conduct MWS risk reduction efforts
     - (U) Integrate missile warning models into improved expendable simulation & analysis model
   - (U) GFE/Other ($ 944 K)
     - (U) GFE to support EA pod integration activities and flight demonstrations
     - (U) SPO operations

3. (U) FY 1995 Planned Program:
   - (U) Milestone II decision
   - (U) Major Contracts ($16,290 K)
     - (U) Conduct MWS source selection
     - (U) Award EMD contract
     - (U) Conduct MWS development
   - (U) Support Contracts ($1,510 K)
     - (U) Program support

Program Element: 0604270F
PE Title: Electronic Warfare Development
Project Number: 4077
Budget Activity : #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

- (U) Prepare for integration efforts on multiple Air Force and Navy platforms
- (U) In-House Contracts ($330K)
  - (U) Assist in MWS source selection efforts
  - (U) Program support
- (U) GFE/Other ($660K)
  - (U) GFE to support AMW group B development
  - (U) SPO operations

4. (U) Program to Completion:
- (U) This is a continuing Program.
- (U) Major Contracts ($TBD)
  - (U) Continue EMD development
  - (U) Conduct hardware and software PDRs and CDRs
  - (U) Fabricate hardware for unit and system testing
  - (U) Conduct MWS qualification testing
  - (U) Support for DT&E and OT&E activities
  - (U) Award Group B production contracts
  - (U) Award Group A integration/installation contracts for multiple platforms
- (U) Support Contracts ($TBD)
  - (U) Program support
- (U) In-House Contracts ($TBD)
  - (U) Conduct MWS DT&E and OT&E testing
  - (U) Perform modeling and simulation activities to support DT&E and OT&E
  - (U) Program support
- GFE/Other ($TBD)
  - (U) Provide GFE test assets
  - (U) SPO operations

Program Element: 0604270F
PE Title: Electronic Warfare Development
Project Number: 4077
Budget Activity : #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

D. (U) WORK PERFORMED BY: (U) Air Force Material Command, Aeronautical Systems Center, Electronic Combat SPO, Wright-Patterson AFB OH, is the prime developing government organization. Assisting in this effort is the Electronic Warfare Directorate at Warner-Robins AFB GA, and the F-15 and F-16 System Program Offices at Wright-Patterson AFB OH.

(U) Major contractors in pre-EMD efforts are: Lockheed-Sanders, Nashua NH; Loral Infrared & Imaging Systems, Lexington MA; Cincinnati Electronics, Cincinnati OH; Raytheon Electromagnetic Systems Division, Goleta CA; Westinghouse Electronic Systems Group, Baltimore MD; Lockheed Fort Worth Division, Fort Worth TX; and McDonnell Douglas Aircraft Division, St Louis MO. The missile warning system EMD contractor has not been selected.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: The AMW program is expanding to encompass both Air Force and Navy tactical aircraft.

2. (U) SCHEDULE CHANGES: Based on the results of a detailed review of Milestone II program-specific exit criteria, the pre-EMD requirements were reduced in scope and the program restructured. In addition, the current acquisition strategy includes a single missile warning procurement regardless of platform (versus separate MWSs for podded and internal programs). Completion of the Cost and Operational Effectiveness Analysis slipped into early FY94 to accommodate updated operational effectiveness models. These above changes have enabled program schedule to be maintained with minimum perturbations.

3. (U) COST CHANGES: FY93 program expanded due to a release of AMW funds previously withheld by OSD and the reprogramming of funds from the OBEWS project. The FY94 program is slightly reduced from last years projection due to this program's allocation of a Congressionally directed general reduction against the PE.

F. PROGRAM DOCUMENTATION:

- (U) TAF 316-88-I-A, System Operational Requirements Document (SORD) for a Missile Warning System on Existing TAF Aircraft, dated 5 Nov 91 (S/NF).

Program Element: 0604270F **Project Number:** 4077 **Date:** February 1994
PE Title: Electronic Warfare Development **Budget Activity :** #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

- (U) HQ TAC/DR Msg, 211125Z Apr 92, TAF 316-88-I-A, System Operational Requirements Document (SORD) for Tactical Aircraft Missile Warning System (S/NF).

G. RELATED ACTIVITIES:
- (U) JPD to be determined at Milestone II.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.
- (U) Navy funding to integrate the common TACAIR MAWS into the F-14, F/A-18, and AV-8B is in PE 0604270N.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation Aircraft Procurment, Budget Activity #105 Modification of Inservice Aircraft, Program Title Common Electronic Countermeasures Equipment								
0	0	0	0	0	$38.0M	$81.5M	TBD	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
- Flight demonstrations with live missile fire	Aug 89 - Oct 93	Successful technology demo
- Air War Center (AWC) pod demonstrations	Jun - Dec 93	Successful EA pod demo
- Pod integration demonstration	Sep - Oct 93	Successful active sys demo

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Program Element: 0604270F
PE Title: Electronic Warfare Development
Project Number: 4077
Date: February 1994
Budget Activity : #5 Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
- EA pod integration	Jan - Feb 94	
- Internal integration	Feb - Jun 94	
- Qualification testing	FY 96	
- DT&E (pod/internal)	FY 97	
- OT&E (pod/internal)	FY 97-98	

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UNCLASSIFIED

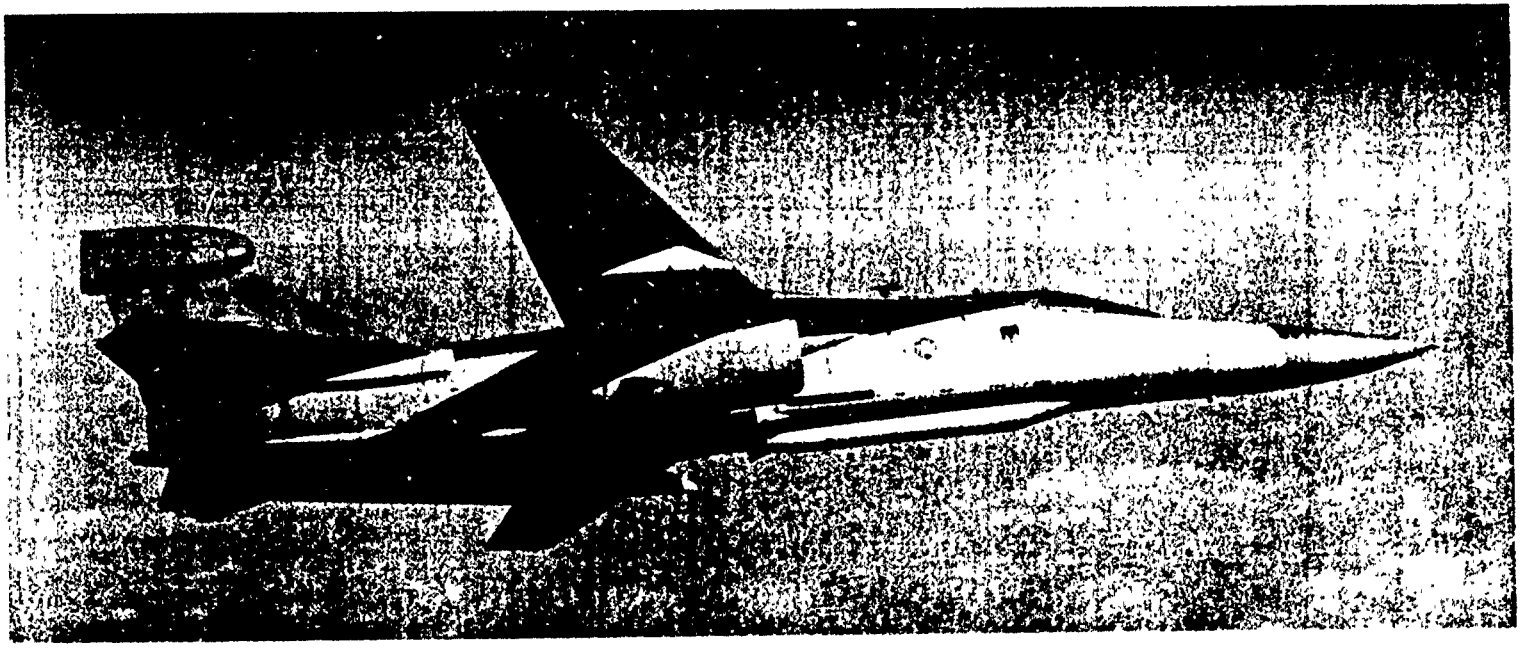
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604270F
PE Title: EW Development

Project Number: #2066
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Program

Date: February 1994

Project Title : EF-111A System Improvement Program



POPULAR NAME: EF-111A SIP

Program Element: #0604270F
PE Title: EW Development
Project Number: #2066
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Program
Date: February 1994

A. (U) SCHEDULE/BUDGET INFORMATION ($ In Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	None	ALM-204 MSIII May 94 Band 4 MSIII Sep 94	None	E/P MS III Aug 96	None	None	DBE MS III Aug 99	None
Engineering Milestones	DBE PDR Dec 92 E/P Fab/Assy Dec 92 DBE CDR Sep 93	Band 4 Hw/Sw Integration Complete Nov 93	E/P Integration Complete Feb 95	DBE HW/SW Assy/Test Nov 96	None	DBE Hw/Sw Integration Jan 98	None	None
T&E Milestones	None	ALM-204 DT&E Mar 94 (End) Band 4 DT&E May 94 (End) Band 4 IOT&E Aug 94 (End)	E/P CT&E End May 95 E/P DT&E/ OT&E Start Jan 95	E/P DT&E/ IOT&E End May 96	None	DBE CT&E End May 96	DBE T&E/ IOT&E End May 99	None
Contract Milestones	None	ALM-204 Product. Contract Award May 94 Band 4 Production Contract Award Sep 94	None	E/P Production Contract Award Sep 96	None	None	DBE Production Contract Award Sep 99	None
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**To Complete**
Major Contract	46,805	48,629	36,000	61,00	41,100	22,500	4,100	0
Support Contract	1,220	800	800	800	800	800	800	0
In-House Contract	1,768	2,100	2,100	2,400	1,900	1,500	1,200	0
GFE/Other	7,140	5,496	11,027	10,300	10,900	10,600	6,100	5,400
Total	56,933	57,025	49,927	74,500	54,700	35,400	12,200	5,400

Program Element: #0604270F **Project Number:** #2066 **Date:** February 1994
PE Title: EW Development **Budget Activity:** #5 Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Program

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The EF-111A System Improvement Program (SIP) updates the EF-111A Tactical Jamming System (TJS). The update is required to keep the system current against the evolving threat. Most modern radars use state-of-the-art Electronic Counter-Countermeasure (ECCM) techniques which limit the present jamming system's capability to counter these radars. The EF-111A SIP consists of four RDT&E projects: 1) The Band 4 transmitter project is needed to improve the reliability, maintainability, and availability (RM& A)of the current band 4 transmitter; 2) The ALM-204 Update Project replaces existing components of the TJS's intermediate/depot level tester with more reliable and more supportable equipment; 3) The Encoder/Processor (E/P) project (a.k.a. Digital Subsystem (DSS) Project) will increase the system's effectiveness and RM&A; and 4) The Digital Based Exciter (DBE) project will increase EF-111's ability to deny, deceive, degrade, and disrupt evolving enemy radars by replacing two of the aircraft's five Multi-Band Exciters with a reprogrammable exciter. These four projects would allow the system to defeat the evolving threat by placing concentrated jamming, with an improved power management system, on specific radars of interest. The program also studied the integration of narrow-beam antennas, Band 1/2 receiver improvements, and ALR-62I Radar Warning Receiver (RWR) integration.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Encoder/Processor (E/P) Project ($40.5M):
   - (U) -- Complete fabrication and assembly of E/P (Nov 92).
   - (U) -- Begin hardware/software integration of E/P (Dec 92)
   - (U) - Digital Based Exciter (DBE) Project ($14.5M):
   - (U) -- Complete DBE Preliminary Design Review (Dec 92).
   - (U) -- Conduct DBE Critical Design Review (Sep 93).
   - (U) - Band 4 Transmitter Project ($1.9M):
   - (U) -- Complete Critical Design Review (Jan 93).
   - (U) -- Begin hardware assembly and integration (Jan 93)

Program Element: #0604270F
PE Title: EW Development
Project Number: #2066
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Program
Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) - Encoder/Processor (E/P) Project ($48.6M):
   - (U) -- Complete hardware/software integration (July 94).
   - (U) - Digital Based Exciter (DBE) Project ($8.0M)
   - -- Closeout CDR (Mar 94)
   - (U) -- Continue hardware/software assembly and test (Nov 96).
   - (U) - Band 4 Transmitter Project ($0.3M):
   - (U) -- Complete Band 4 project developmental test and evaluation (DT&E) (May 94).
   - (U) -- Complete Band 4 project initial operational test & evaluation (IOT&E) and trial installation (Aug 94).
   - (U) -- Conduct MS III review for Band 4 transmitter project production contract award (Aug 94).
   - (U) - ALM 204 Project ($0.1M):
   - (U) -- Complete developmental test and evaluation (DT&E) and initial operational test and evaluation (IOT&E)
   - (U) (Mar 94).
   - (U) -- Conduct MS III review for production contract award (May 94).

3. (U) FY 1995 Planned Program ($49.9M):
   - (U) - Encoder/Processor (E/P) Project:
   - (U) -- Complete hardware/software integration (Feb 95).
   - (U) -- Begin developmental test and evaluation (DT&E) (Jun 95)
   - (U) - Digital Based Exciter (DBE) Project:
   - (U) -- Continue hardware/software assembly and test (Nov 96).

D. (U) Work Performed By: Aeronautical Systems Center (ASC/RWJ) Wright-Patterson AFB, OH, is the EF-111A SIP System Program Director (SPD). Therefore, ASC/RWJ manages the entire development effort. Prime contractor for the E/P, DBE, and ALM-204 projects is Grumman Aerospace Corp., Bethpage , NY. Warner-Robins Air Logistics Center, Robins AFB, GA manages the Band 4 transmitter project for the ASC/RWJ SPD. Prime contractor for Band 4 transmitter is Motorola Corp., Scottsdale, AZ.

Program Element: #0604270F **Project Number:** #2066 **Date:** February 1994
PE Title: EW Development **Budget Activity:** #5 Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Program

E. (U) COMPARISON WITH FY 1993 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

2. (U) SCHEDULE CHANGES: The EF-111A SIP System Program Director (SPD) has rephased the Encoder/Processor (E/P) and Digital Based Exciter (DBE) projects to keep the E/P and DBE programs split and to acquire the E/P project at the fastest prudent pace and the DBE project as soon as possible with the remaining funding. Schedule/cost growth and FY 94 Congressional reductions caused the SPD to rephase the E/P and DBE projects.

3. (U) COST CHANGES: Rephasing the EF-111A SIP program results in total cost increases.

F. (U) PROGRAM DOCUMENTATION:
(U) TAC SON 319-88, (S) dated 23 Oct 89
(U) TAC SON 337-88, (S) dated 15 Sep 89
(U) TAF SORD 319-88-I/II-A (Revision 1), (S-NF-WN-NC) dated 20 Jun 91

G. (U) RELATED ACTIVITIES:
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

Program Element: #0604270F
PE Title: EW Development
Project Number: #2066
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #4-Tactical Program
Date: February 1994

Appropriation: 3010F, Budget Activity: #105 Modification of In-Service Aircraft, Program Title: EF-111 Squadrons, PE#027252F.

	FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
BP1100 BAC #05 Modernization of in Service Aircraft	5,368	5,926	0	51,448	55,150	54,204	34,895	27,634	234,628
BP1900 BAC #07 Aircraft Support Equipment & Facilities	9,8320	16,771	23,478	452	450	40,996	49,905	59,266	222,375
BP1600 BAC #06 Aircraft Spares & Repair Parts	0	700	0	5,000	7,000	6,000	7,000	0	25,500

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Band 4 project DT&E/IOT&E Start	Dec 93	In Progress
ALM-204 project DT&E/IOT&E Start	Feb 94	In-Progress

T&E ACTIVITY (TO COMPLETION)

Event	Date	Remarks
TEMP approval	3QFY94	None
ALM-204 project D/IOT&E Complete	3QFY94	None
Band 4 project DT&E/IOT&E Complete	4QFY94	None
E/P PROJECT DT&E/IOT&E Complete	3QFY96	None
DBE DT&E/IOT&E Complete	3QFY99	None

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: # 0604321F **Date: February 1994**
PE Title: Tactical Fusion Program
Budget Activity : # 5 Engineering & Manufacturing Development (EMD)
Old Budget Activity : # 4 - Tactical Programs

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Joint Tactical Fusion Program								
2,883	2,097	8,666	3,958	2,045	1,686	1,047	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: Develops force and unit-level intelligence automation capability as part of the Combat Intelligence System (CIS). CIS is in Research Category 6.5 because it develops the structure to integrate four existing programs into a single effort. Under CIS, the four acquisition programs Intelligence Correlation Module (ICM), a near-real time (NRT), all-source, tactical intelligence fusion and processing/dissemination system; Sentinel Byte, providing unit level automation at Air Force Wing/Squadrons; Constant Source, providing worldwide timely intelligence to both force and unit-level; and Rapid Application of Air Power (RAAP), providing automated situation and target analysis; have been combined under single acquisition management. This PE combines acquisition funding for ICM, already existing in this PE as the remainder of the Joint Tactical Fusion Program, and FY95-98 funding for Sentinel Byte, previously part of PE #0207431F Tactical Air Intelligence Systems. ICM is a near-real time (NRT), all-source, tactical intelligence fusion and processing/dissemination system. The air combat forces have a need to rapidly (on a NRT basis) exploit time-sensitive and high volume multi-sensor information. The ICM will be fielded at the Combat Air Forces Air Operations Centers (AOCs) to support Air Tasking Order (ATO) generation. The ICM will interface with the unit level intelligence system, Sentinel Byte, and force level intelligence systems. Sentinel Byte provides unit level automation at Air Force Wing/Squadrons. The program applies off-the-shelf technology, commercial/government standards, and application of intelligence software derived for theater production. The Sentinel Byte system is required to provide fused intelligence pictures at Headquarters/Numbered Air Forces (HQ/NAF) levels to unit level, provide secure intrabase Wing/Squadron telecommunications between intelligence systems (in garrison USAFE and PACAF only; ACC addressing mobile communications with interfaces to long

Program Element: # 0604321F
Date: February 1994
PE Title: Tactical Fusion Program
Budget Activity : #5 Engineering & Manufacturing Development (EMD)
Old Budget Activity : #4 - Tactical Programs

haul communications requirements), to integrate the unit level intelligence picture on one system, and provide automation support to assist unit level intelligence briefings, etc. It adds data feeds to the Air Force Mission Support System (AFMSS), connectivity to national, theater wing and unit C3I systems and tools for filtering and focusing of intelligence information at the unit level. Sentinel Byte's goal is to direct and expedite the flow of vital operational intelligence information to the wing staff and combat aircrews.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) FY 1993 Accomplishments:
- (U) - Completed Phase I CTAPS implementation and software development. ($1.600)
- (U) - Began implementation of PACAF collateral ICM in conjunction with intelligence automation developments and CTAPS deployments. (Not separately priced - NSP)
- (U) - Began creating Republic of Korea releasable (RELROK) version of ICM. (NSP)
- (U) - Delivered ICM version 1.0 to CTAPS Nov 92. (NSP)

(U) FY 1994 Plans:
- (U) - Begin to integrate system with intelligence automation upgrades, including collection management, imagery, common mapping system, and battle damage assessment capabilities. ($1.254)
- (U) - Begin developing SCI-level correlation capability. ($0.843)

(U) FY 1995 Plans:
- (U) - Begin merger of Sentinel Byte into CIS applications. ($1.356)
- (U) - Begin to merge intelligence automation upgrades into ICM. ($2.967)
- (U) - Begin merger of ICM software to CIS application software. ($0.933)
- (U) - Implement SCI-level correlation capability and continue to enhance capability. ($1.357)
- (U) - Implement intelligence automation interface capabilities. ($2.053)

Program Element: # 0604321F **Date:** February 1994
PE Title: Tactical Fusion Program
Budget Activity : #5 Engineering & Manufacturing Development (EMD)
Old Budget Activity : #4 - Tactical Programs

(U) Work Performed By: Air Force Material Command (AFMC)/Electronic Systems Center (ESC) is the Air Force in-house developing organization. Contractors working on both ICM and Sentinel Byte are PRC Corporation, Omaha NE; Infotec Development Inc., Wakefield MA; Ampersand Inc., Westford MA and BTG Corporation, Vienna VA.

(U) Related Activities:
- (U) - Program Element #0603260F, Intelligence Advanced Development.
- (U) - Program Element #0207431F, Combat Air Intelligence Systems (CAIS).
- (U) - Program Element #0604321A, Army Joint Tactical Fusion Program.
- (U) - Program Element #0207438F, Theater Battle Management C4I (TBM C4I).
- (U) - Program Element #0301335F, Intelligence Data Handling Systems (IDHS).
- (U) - Program Element #0207414F, Pacific Command/Control System.
- (U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Other Procurement, WSC 832010, Combat Air Intelligence Systems								
209	11,170	2,993	2,991	3,315	2,912	1,755	Cont	TBD
Other Procurement, WSC 832010, Pacific Command/Control System								
0	0	11,790	8,980	9,940	8,750	5,267	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604408F
PE Title: National Launch System
Budget Activity: 5 - Engineering & Manufacturing Development
Old Budget Activity: 6 - Defense Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ In Thousands):

	FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
3941	Advanced Launch System								
	9,435	0,000	10,176	10,242	10,301	10,392	10,470	Continuing	TBD
Total									
	9,435	0,000	10,176	10,242	10,301	10,392	10,470	Continuing	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: The National Launch System was terminated at the direction of Congress in 1993. The current program supports the current fleet and future development efforts through the compilation of space launch requirements, development and demonstration of existing technology for space launch, and concept studies for promising advances to the Nation's space launch capability for the national security sector. There are three launch sectors that have differing launch requirements that need to be continually evaluated and updated to ensure all upgrades and developments to our space launch fleet are consistent with the driving requirements. Opportunities are expected to present themselves in the future when an existing technology may find application in the space launch arena. Applications that benefit the entire fleet or lead to the development of a new system will be developed and demonstrated by this program. Lastly, concepts will continually need to be evaluated and compared against the national set of requirements. Such studies will be done as the needs arise, but for the most part, they will maintain an annual level-of-effort.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) Project 3941, National Launch System (NLS): NLS has been terminated. However, the follow-on effort supports the national security sector by providing the necessary groundwork to ensure the Air Force will be able to meet its launch requirements far into the future. Today's expendable fleet will continue to operate into the foreseeable future, however, by creating and maintaining one set of national launch requirements, the Air Force will

Program Element: #0604408F
PE Title: National Launch System
Budget Activity: 5 - Engineering & Manufacturing Development
Old Budget Activity: 6 - Defense Wide Mission Support

Date: February 1994

be better able to manage change in the future. For example, upgrades to the current fleet can be prioritized and perhaps work toward a standardized set of requirements that will hopefully lead to reduced operating costs and increased operability and reliability of our space launch capability.

(U) FY 1993 Accomplishments:
(U)- Terminated National Launch System (NLS) Program ($9,435,000)

(U) FY 1994 Plans:
(U)- No funds

(U) FY 1995 Plans:
(U)- National space launch requirements creation and maintenance ($2,100,000)
(U)- Development and demonstrations of existing technologies for application to space launch ($4,100,000)
(U)- Concept and other studies for fleet-wide improvements/upgrades ($3,976,000)

(U) Work Performed By: The responsible Air Force agency is Air Force Materiel Command's Space and Missile Systems Center, Los Angeles AFB, CA. Systems engineering is provided by the Aerospace Corporation, El Segundo, CA.

(U) Related Activities: None.

(U) Other Appropriation Funds ($ in Thousands): None.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

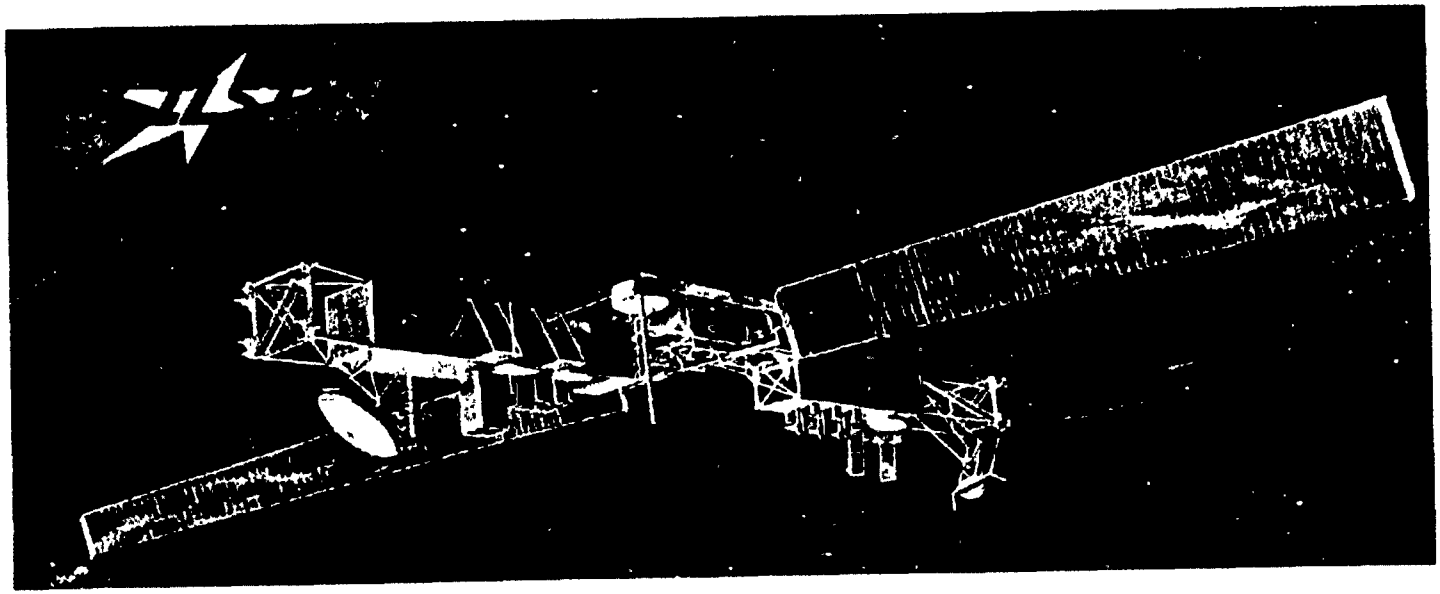
Program Element: 0604479F
PE Title: Milstar LDR/MDR Satellite Communications

Project Number: 5010
Budget Activity: 5 - Engineering, Manufacturing, and Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

Project Title: Milstar Satellite Communications System

POPULAR NAME: Milstar



Program Element: 0604479F
PE Title: Milstar LDR/MDR Satellite Communications

Project Number: 5010
Budget Activity: 5 - Engineering, Manufacturing, and Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY1998	FY 1999	To Complete
Program Milestones	Milstar (M*) PR DAB Oct 92							
Engineering Milestones	M* Sat 1 Deliv Delivery - Feb 93	M* Sat 1 Launc 7 Feb 94 M* Sat 2 Deliv Aug 94	M* Sat 2 Lnch Date May 95 M* II MDR Sys CDR-1/Qtr 95			Delivery Satel-lite 3M	Deliver Satel-lite 4 Launch Sat 3M	Deliver Satel-lites 5 and 6 Launch Sats 4 through 6
Test and Eval Milestones		M* Sat 1 DT&E M* I Ph 1 IOT&E	M* I Ph I IOT&E	M* I Ph II IOT&E				M*II IOT&E
Contract Milestones	M* MDR Dev Oct 92	M* Sat 3M Suppl Agmnt	M* Sats 5-6 Parts Buy	M* Sats 5-6 Contract				
BUDGET $000	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	Budget Total (To Complete)
Major Contracts	835,583	769,165	524,424	684,952	740,533	687,130	595,127	964,147
Support Contracts	54,200	57,784	63,864	60,366	64,158	63,235	63,645	261,006
In-House Contracts	3,100	3,861	4,116	1,314	1,099	4,127	3,751	4,377
GFE/Other	17,700	9,509	14,844	11,169	5,099	6,436	4,613	19,470
Total	* 910,583	* 840,319	607,248	757,801	810,889	760,928	668,136	1,249,000

* FY 1993/1994 Funding is in PE 33601F

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Milstar is a joint service program to develop and acquire extremely high frequency (EHF) satellites, satellite mission control segment, and new or modified communication terminals for survivable, jam-resistant, world-wide, secure communications for the strategic and tactical warfighter. This descriptive summary addresses the space and mission control segments of the Milstar program.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   (U) Milstar I ($312.8M)
   (U) - Delivered Satellite 1 and placed in storage.

Program Element: 0604479F
PE Title: Milstar LDR/MDR Satellite Communications

Project Number: 5010
Budget Activity: 5 - Engineering, Manufacturing, and Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

(U) - Completed assembly and began testing of Satellite 2.
(U) - Continued build of Sat 3 bus and Low Data Rate (LDR) payload (phased down in preparation for modification to incorporate Medium Data Rate (MDR) payload)
(U) - Begin contractor support for the Mission Control Segment (MCS) software sustainment for mission planning and satellite operations.
(U) - Continue contractor software/hardware support for MCS equipment.

(U) Milstar II ($598.2M)
(U) - Awarded contract for Milstar MDR Engineering and Manufacturing Development (EMD) and Satellite 4 with LDR and MDR payloads.

2. (U) FY 1994 Planned Program:

(U) Milstar I ($319.0M)
(U) - Removed Satellite 1 from storage and shipped to launch base.
(U) - Integrated Satellite 1 to launch vehicle and completed pre-launch checkout.
(U) - Launched Satellite 1 and performing on-orbit checkout.
(U) - Complete on orbit Developmental Test and Evaluation (DT&E) and initiate Phase I Initial Operational Test and Evaluation (IOT&E).
(U) - Deliver Satellite 2 and place in storage.
(U) - Implement engineering change proposals (ECPs).
(U) - Develop and implement modifications to Mission Control Element (MCE) to enhance mission conrol operations.
(U) - Continue contractor support for MCS software sustainment for mission planning and satellite operations.

(U) Milstar II ($521.3)
(U) - Award Satellite 3M Supplemental Agreement on Milstar II contract.
(U) - Store bus and LDR payload components for Satellite 3M pending MDR modification.
(U) - Continue EMD of the MDR payload; complete critical design review (CDR).
(U) - Start integration and test of Satellite 3M bus, LDR payload, and LDR modifications.

3. (U) FY 1995 Planned Program:

(U) Milstar I ($197.0M)
(U) - Launch Satellite 2, perform on-orbit checkout, and complete Milstar I on-orbit Phase I IOT&E.
(U) - Implement ECPs as needed based on operational requirement.
(U) - Develop and implement modifications to MCE to enhance mission control operations.
(U) - Continue contractor support for MCS software sustainment for mission planning and satellite operations.
(U) - Develop and field operator training equipment.

(U) Milstar II ($410.2M)
(U) - Continue MDR payload manufacturing for Satellites 3M and 4.
(U) - Continue bus integration and test for Satellite 3M.
(U) - Start bus component integration manufacturing for Satellite 4.
(U) - Complete LDR integration and test for Satellite 3M.
(U) - Complete LDR manufacturing and start LDR integration and test for Satellite 4.

Program Element: 0604479F
PE Title: Milstar LDR/MDR Satellite Communications

Project Number: 5010
Budget Activity: 5 - Engineering, Manufacturing, and Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

(U) - Initiate parts procurement for Satellites 5 and 6.
(U) - Start Milstar II upgrade of MCS software for mission planning.

4. (U) Program to Completion:
   (U) Milstar I
   (U) - Complete Phase II IOT&E.
   (U) - Implement ECPs as needed based on operational requirement.
   (U) Milstar II
   (U) - Complete fabrication, integration, test, delivery, and launch of Satellites 3M through 6.
   (U) - Implement ECPs as needed based on operational requirement.
   (U) - Complete modification/upgrade of the Mission Control Segment.

D. (U) WORK PERFORMED BY: Development of the Milstar space and mission control segments is managed by a program office located at AF Materiel Command's Space and Missile Systems Center Los Angeles AFB, CA under the direction of the AF Program Executive Officer (PEO) for Space. Milstar satellites and ground control equipment are developed by Lockheed Missiles and Space Co., Sunnyvale, CA. Systems Engineering and technical support is provided by the Aerospace Corporation, El Segundo, CA; MITRE Corporation, Bedford, MA; and Lincoln Laboratory, Bedford, MA.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: Due to the Titan IV launch failure in August 1993, Satellite 1 launch was delayed until the launch vehicle problem was resolved. The Air Force launched Satellite 1 on 7 Feb 94. Satellite 2 launch will be slipped accordingly, and is scheduled for a launch in FY 1995. All associated development and operational testing slips with the launches.
3. (U) COST CHANGES: As a result of the Bottom Up Review (BUR) decision, funds were deleted for Milstar II satellites 7 and on. Funding for the Polar Adjunct system and the Advanced MILSATCOM System (Medium Launch Vehicle-class satellite) was broken out from the Milstar LDR/MDR satellite program element to two new program elements (0603432F and 0603430F).

F. (U) PROGRAM DOCUMENTATION:
- (U) Milstar Operational Requirements (ORD), 4 Sep 92.
- (U) Milstar Test and Evaluation Master Plan (TEMP), 25 Aug 92.
- (U) Milstar Acquisition Decision Memorandum, 28 Oct 92.
- (U) Milstar System Threat Assessment Report (STAR), Apr 92.

G. (U) RELATED ACTIVITIES:
- (U) PE 0303601F, Milstar Terminals

Program Element: 0604479F
PE Title: Milstar LDR/MDR Satellite Communications

Project Number: 5010
Budget Activity: 5 - Engineering, Manufacturing, and Development
Old Budget Activity: 3 - Strategic Programs

Date: February 1994

- (U) PE 0303603F, Milstar Satellites
- (U) PE 0603430F, Advanced MILSATCOM
- (U) PE 0603432F, Polar Adjunct
- (U) PE 0302015F, National Emergency Airborne Command Post, E-4B
- (U) PE 0303142A, Defense Satellite Communications System Ground Terminals
- (U) PE 0303605F, SATCOM Terminals
- (U) PE 0303110F, Defense Satellite Communications System (DSCS)
- (U) PE 0603433F, DSCS Replenishment
- (U) PE 0305144F, Titan IV Space Launch Vehicles
- (U) PE 0604577N, EHF Satellite Communications
- (U) PE 0303142A, Tactical Communications Ground Environment
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATIONS FUNDS ($ in Thousands): None.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Phase IIIA Interoperability Demonstration	Mar 92	Verified tri-service interoperability
Final Satellite 1 pre-launch Developmental Test and Evaluation (DT&E)	Jun 92	Verified spacecraft, mission control (MC), and payload integration

T&E ACTIVITY (TO COMPLETION)

Event	Date	Results
Final Satellite DT&E	Apr 94	Verify on-orbit satellite, MC, and terminal compatibility
Multi-service pre-IOT&E Technical Evaluation	FY94	
Phase IV-VIII interoperability Demonstration	FY95-99	Verify tri-service interoperability
LDR IOT&E Phase I	FY95	Satellite to terminals, satellite to MC
LDR IOT&E Phase II	FY96	Mission Control and Crosslink Systems
In Plant MDR System End-to-end Test	FY97	Verify MDR payload to terminal compatibility
On-orbit Milstar I compatibility	FY97	Verify backward compatibility of MDR control systems to LDR only spacecraft
MDR IOT&E	FY00	MDR System

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604601F
Date: February 1994
PE Title: Nuclear, Biological, and Chemical Defense Equipment
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

A. (U) RESOURCES ($ In Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3321 Chemical and Biological Agent Detection and Warning								
6,144	1,381	2,108	8,075	8,128	7,837	9,425	Cont	TBD
3337 Individual Protection								
8,512	8,394	5,479	347	1,937	2,903	3,269	Cont	TBD
3764 Decontamination								
0	0	0	0	800	1,250	3,697	Cont	TBD
Total								
14,656	9,775	7,587	8,422	10,865	11,990	16,391	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program is under Budget Activity #5 because it contains projects funded by appropriation 3600, research and development category 6.5, which supports Engineering and Manufacturing Development (EMD) of systems to detect, warn against, decontaminate, and protect personnel and equipment in a nuclear, biological, and chemical environment and provide a critical deterrent to the use of nuclear, biological, and chemical weapons. Without these protective systems, sortie

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generation on a sustained basis will be degraded significantly. "Nuclear" has been added to the title of this program element to provide for radiological detection and protection.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995 :

(U) Project 3321, Detection and Warning: Develops detectors to warn personnel of nuclear, biological, and chemical contamination.

(U) FY 1993 Accomplishments:
(U) - Initiated Biodetection/MORNING SONG front end analysis. ($108K) (Sep 93)
(U) - Supported Biological Warfare Joint Program Office. ($150K) (Sep 93)
(U) - Supported Automatic Mustard Agent Detector (AMAD) urgent and compelling buy. ($77K) (Sep 93)
(U) - Provided engineering management support, scientific, engineering and technical assistance, and miscellaneous non-program specific support. ($668K) (Sep 94)
(U) - Initiated tactical aircraft decontamination studies and cargo aircraft contamination control studies. ($345K) (Apr 94)
(U) - Initiated a study to determine an employment concept for chemical agent point detectors to include networking. ($329K) (Jun 94)
(U) - Initiated a joint service study to determine the dispersion characteristics of a biological cloud. This data will be used to help determine agent challenge to the air base. ($631K) (Jun 94)
(U) - Initiated a study to develop Air Force unique scenarios and run models whose output will be used to help determine biological detector requirements. ($263K) (Oct 94)
(U) - Initiated a study to determine how effective the Air Force biological detector prototype will be against a biological attack. ($262K) (Jan 94)
(U) - Initiated a study to develop procedures and training guidelines for an Air Force procured chemical agent monitor. ($302K) (Jul 94)
(U) - Initiated container engineering change proposal to complete shelter development. ($115K) (Nov 93)
(U)- Support RADIAC COTS program ($5K) (Sep 93)

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(U) FY 1994 Plans:
(U) - Miscellaneous studies/analyses for Collective Protection, and Firefighters' and EOD Ensembles. ($131K) (Nov 94)
(U) - Integrate chemical detectors with communication capabilities into a detector network and test the system. ($375K) (Oct 94)
(U) - Continue tactical aircraft decontamination studies. ($430K) (Sep 94)
(U) - Provide support for various studies and analyses for future programs and continuing support of AMAD/AVAD buy. ($50K) (Sep 94)
(U) - Study the effect of Air Force doctrine on the development and deployment of biological detectors. ($121K) (Feb 95)
(U) - Initiate a study to develop Air Force unique scenarios and run models whose output will be used to help determine the requirements for a detector of chemical and biological agents in water. ($250K) (Sep 94)
(U) - Provide support for RADIAC COTS program. ($24K) (Sep 93)

(U) FY 1995 Plans:
(U) - Initiate study to develop an employment concept for biological detectors to include networking. ($386K) (Dec 95)
(U) - Provide support for Automatic Vapor Agent Detector (AVAD) and Multi-Function Radiac (MFR) production efforts. ($75K) Sep 95)
(U) - Conduct a threat-based concept study and develop an employment concept for an aircraft interior detector. ($838K) (Mar 95)
(U) - Validate the requirement for an individual vapor detector. ($809K) (Sep 95)

(U) Program to Completion: N/A, continuing program.

(U) Work Performed By: Contractor for technical support is Battelle, Engineering Management Support, Brooks AFB TX. In-house Development organizations responsible for elements of the program are the Human Systems Center, Brooks AFB TX, and the Armstrong Laboratory, located at both Brooks AFB TX and Wright Patterson AFB OH.

(U) Related Activities:
(U) - Program Element #0602202F, Human Systems Technology.
(U) - Program Element #0603231F, Crew Systems Technology.

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(U) - Program Element #0604617F, Air Base Operability.
(U) - Program Element #0604703F, Aeromedical Chemical Defense System Development.
(U) - Program Element #0603806A, Chemical/Biological Defense Equipment Advanced Development.
(U) - Program Element #0603514N, Ship Survivability.
(U) - Program Element #0604506N, Biological/Radiological/Chemical Warfare Countermeasures.
(U) - Program Element #0603635M, Marine Corps Ground Combat/Support Arms.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, BA #4, Other Base Maintenance and Support, Biological Agent Detector								
0	0	0	0	0	2,321	3,364	Cont	Cont
Appropriation 3080, BA #4, Other Base Maintenance and Support, Automatic Mustard Agent Detector								
1,550	0	950	0	0	0	0	Comp	1,550
Appropriation 3080, BA #4, Other Base Maintenance and Support, Automatic Vapor Agent Detector								
0	0	0	1,000	4,000	0	0	Cont	Cont
Appropriation 3080, BA #4, Other Base Maintenance and Support, Multi-Function Radiac								
7,899	0	2,715	1,173	1,048	1,157	0	Comp	13,992
Appropriation 3080, BA #4, Other Base Maintenance and Support, Aircraft Interior Detector								
0	0	0	0	0	1,000	2,874	Cont	Cont
Appropriation 3010, BA #4, Other Base Maintenance and Support, Aircraft Interior Detector								
0	0	0	0	0	7,000	7,200	Cont	Cont

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0604601F
PE Title: Nuclear, Biological and Chemical Defense Equipment
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

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(U) Project 3337, Individual Protection: Based upon changing world conditions chemical/biological weapons have emerged as a major threat to our forces. Because of this, the using commands have issued operational requirements to protect personnel against agents while minimizing the impact to their performance. The Air Force is developing clothing and equipment (both aircrew and ground crew) to protect personnel in chemical/biological environments.

(U) FY 1993 Accomplishments:
(U) - Began Aircrew Eye/Respiratory Protection (AERP)/COMBAT EDGE integration studies. ($1,300K) (May 94)
(U) - Completed DT&E/OT&E for the B-1B to meet HQ ACC accelerated temporary modifications to provide chem/bio protection for aircrew personnel one year ahead of schedule. ($327K) (Sep 93)
(U) - Performed Fire Fighter's Ensemble undergarment wear test. ($73K) (Mar 94)
(U) - Conducted high humidity test on chemical protective fabrics. ($200K) (Dec 93)
(U) - Initiated development of E-3 and F-16 Class V modification designs for AERP. ($406K) (Jun 94)
(U) - Completed development and testing of Passive Anti-Drown Device (PADD) and AERP Engineering Change Proposals and valsalva redesign/test. ($593K) (Mar 94).
(U) - Participated in Joint Lightweight Individual Suit Technology (JSLIST) program as a candidate for the Ground Crew Ensemble. ($247K) (Aug 93)
(U) - Initiated studies in decontamination of clothing for safe reuse. ($120K) (Dec 93)
(U) - Provided support for ground crew equipment (mask second skin) testing and related studies. ($186K) (Sep 93)
(U) - Provided support for Aircrew Ensemble production, engineering management, scientific, engineering and technical assistance, Human Systems Center assessments, and System Program Office operations. ($3,591K) (Sep 94
(U) - Joined the Army Laundry and Decontamination Dry Cleaning System (LADDS) program. ($325K) (Dec 93)
(U) - Continued EMD for Disposable Eye/Respiratory Protection (DERP). ($1,144K) (Sep 93).

(U) FY 1994 Plans:
(U) - Complete DT&E/OT&E of DERP for an FY 95 production award. ($1,952K) (Sep 94).
(U) - Complete studies with the LADDS program and continue decon studies. ($1,723K) (Nov 94)

Program Element: #0604601F **Date:** February 1994
PE Title: Nuclear, Biological and Chemical Defense Equipment
Budget Activity: #5 - Engineering and Manufacturing Development
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(U) - Miscellaneous support for Aircrew Ensemble production, engineering management support, scientific, engineering and technical assistance, Human Systems Center assessments, chemical surety testing and system program office operating support. ($2,834K) (Sep 94
(U) - Perform aircrew threat/chemical agent challenge analysis. ($100K) (Sep 94
(U) - Perform improvements on PADD. ($295K) (Dec 94)
(U) - Conduct AERP - F-16 compatibility test. ($90K) (Mar 94)
(U) - Continue participation with the JSLIST program. ($1,300K) (Mar 94)
(U) - Initiate design and modification of Airborne Command, Control, and Communication aircraft for AERP. ($100K) (Mar 94)

(U) FY 1995 Plans:
(U) - Continue decontamination effort on Ground Crew Ensemble (GCE) in parallel with the JSLIST program. ($2,704K) (Sep 95)
(U) - Incorporate off-the-shelf microclimate cooling system to meet Air Force requirements for body cooling. ($150K) (Sep 95)
(U) - Support final testing of DERP and production contract. ($336K) (Sep 95)
(U) - Conduct front-end analysis of the Firefighter's Ensemble. ($75K) (Sep 95)
(U) - Support AERP aircraft modifications and chemical/surety test/analysis; provide engineering management support, scientific, engineering and technical assistance, Human Systems Center assessments, and System Program Office operating support. ($2,214K) (Sep 95)

(U) Program to Completion: N/A, continuing program.

(U) Work Performed By: Contractor for AERP is ILC Dover, Frederica DE. Contractors for DERP are ILC Dover, Frederica DE; Mine Safety Appliances, Murraysville PA; and National Draeger, Pittsburgh PA. In-house development organizations for this and all other tasks under this project are Human Systems Center (HSC), Brooks AFB TX; and several Air Logistics Centers whose Headquarters are at Air Force Material Command, Wright-Patterson AFB OH.

(U) Related Activities:
(U) - Program Element #0602202F, Human Systems Technology.

Program Element: #0604601F
PE Title: Nuclear, Biological and Chemical Defense Equipment
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(U) - Program Element #0603231F, Crew Systems Technology.
(U) - Program Element #0604617F, Air Base Operability.
(U) - Program Element #0604703F, Aeromedical Chemical Defense System Development.
(U) - Program Element #0603806A, Chemical/Biological Defense Equipment Development.
(U) - Program Element #0603514N, Ship Survivability.
(U) - Program Element #0604506N, Biological/Radiological/Chemical Warfare Countermeasures.
(U) - Program Element #0603635M, Marine Corps Ground Combat/Support Arms.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, AERP								
11,867	0	3,000	7,024	0	0	0	21,891	42,991
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, Ground Crew Ensemble								
0	0	0	3,410	5,000	9,210	10,624	Cont	Cont
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, Explosive Ordnance Disposal Ensemble								
0	0	0	0	0	0	3,650	Cont	Cont
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, Fire Fighter's Ensemble								
226	0	0	500	2,200	0	0	2,926	2,926
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, Disposable Eye Respiratory Protection								
0	0	1,067	1,000	1,000	1,500	2,500	Cont	Cont
Appropriation 3010, BA #4, Other Base Maintenance and Support Program, AERP								
2,800	3,400	3,500	6,600	6,800	0	0	23,100	23,200

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604602F
PE Title: Armament/Ordnance Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2784	Armament Standardization/Control/Munitions Material Handling Equipment							
1509	1887	1830	1823	1840	1798	1876	Cont.	TBD
3133	Bombs and Fuzes							
1225	7517	8820	7976	3693	1529	0	Cont.	TBD
4003	Adverse Terrain Ammunition Assembly Trailer/Adverse Terrain Tow Vehicle							
1990	497	0	0	0	0	0	0	3190
5613	Containers							
1115	1391	203	203	201	204	207	Cont.	TBD
Total								
5839	11,292	10,853	10,002	5734	3531	2083	Cont.	TBD

B: (U) BRIEF DESCRIPTION OF ELEMENT

The Armament Standardization/Control/Munitions Material Handling Equipment (MMHE) Project and the Container Design Retrieval System (CDRS) Project satisfy several USAF and tri-service requirements for standardization of armament and support equipment and eliminates unnecessary duplication of MMHE and containers. The Bombs and Fuzes Project satisfies TAF ROC 323-75, Proximity Fuzes, dated 2 Sep 75; TAF SON 305-85, Hardened Target Munitions, dated 14 Oct 86; OSD Letter requirement for a common bomb fuze, dated 11 Apr 80; SAC message 041901Z Feb 87, M117 High Drag Capability(s); Joint Mission Need Statement (MNS) TAF 401-91 for Adverse Weather Strike Capability, dated 4 Nov 91;, CAF MNS 314-90 for the Advanced Fuze Family, dated 13 May 93. This project funds development of specific fuze type for air-to-ground munitions. The Adverse Terrain Ammunition Assembly Trailer/Adverse Terrain Tow Vehicle (ATAAT/ATTV) project satisfies TAF SON 314-87, ATAAT/ATTV, dated 18 Nov 88, and funds development of an improved munitions trailer and tow vehicle. The RDT&E Research Category for this program element is 6.5,

Program Element: 0604602F
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EMD, and, therefore, is funded in budget activity 5. The program element is performing efforts in both research catagory 6.5 Engineering and Manufacturing Development (project 3133), and 6.7 Operational Systems Development (projects 2784 and 5613).

C: (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995 ($ in Thousands)

(U) Project 2784, Armament Standardization/Control/Munitions Material Handling Equipment (MMHE): This continuing project improves standardization, commonality, and development of improved munitions handling and armament equipment to preclude duplication and proliferation. This project's efforts are limited to the study, design and development of MMHE and armament control systems. Any procurement will be performed and funded by the applicable weapons systems project.

(U) FY 1993 Accomplishments:
(U) - Initiated/continued/completed design/development of various MMHE projects, including completing development of the Universal Wing and Fin Container, the LANTIRN Pod maintenance/storage stand, and an enhancement to the Rapid Assembly Munitions System. ($1476)
(U) - Initiated feasibility study for robotics applications to munitions operations. (ECD: FY9?) ($22)
(U) - Initiated feasibility study of universal armament testing capability. (ECD: FY97) ($11)

(U) FY 1994 Plans:
(U) - Initiate/continue/complete design/development of various MMHE projects, including evaluation of the B-1B Conventional Bomb Module Preloading Adapter and the Navy Linkless Ammunition Loading System for Air Force use. ($887)
(U) - Continue feasibility study for robotics applications to munitions operations. (ECD: FY97) ($750)
(U) - Continue feasibility study of universal armament testing capability. (ECD: FY97) ($250)

(U) FY 1995 Plans:
(U) - Initiate/continue/complete design/development of various MMHE projects, including completing design of the B-1B Conventional Bomb Module Preloading Adapter, completing testing of the Navy Linkless Ammunition Loading System, and continuing the Adverse Terrain Ammunition Assembly Trailer. ($1810)
(U) - Select and evaluate feasible robotics applications to munitions operations. (ECD: FY97) ($10)
(U) - Select and evaluate feasible universal armament testing capability. (ECD: FY97) ($10)

Program Element: 0604602F
PE Title: Armament/Ordnance Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Work Performed By: Aeronautical Systems Center (ASC/ALZ) at Eglin AFB, FL, manages this project. Support contractors are: Technical Engineering Acquisitions Support (TEAS): Sverdrup Technologies, Tullahoma, TN; and Technical Engineering Acquisition Management Support (TEAMS): Information and Systems Network Corporation, Bethesda, MD.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable

(U) International Cooperative Agreements: Not Applicable

(U) Project 3133, Bombs and Fuzes: This project develops and improves conventional bombs and fuzes including the development of the Joint Programmable Fuze (JPF) and a unitary warhead for the Joint Direct Attack Munition (JDAM) program.

(U) FY 1993 Accomplishments:
(U) - Awarded the JPF development contract and began EMD program, including initiating requirements analysis. (ECD: FY96) ($1225)

(U) FY 1994 Plans:
(U) - Continue the JPF development effort, including developing baseline design, fabricating model hardware, defining test concepts, and optimizing manufacturing processes. (ECD: FY96) ($2034)
(U) - Begin design and fabrication of JPF component hardware. (ECD: FY95) ($4383)
(U) - Begin JPF component hardware contractor test and evaluation (CT&E). (ECD: FY95) ($1100)

(U) FY 1995 Plans:
(U) - Continue the JPF development effort, including completion of detail design and (CT&E). (ECD: FY96) ($1000)
(U) - Begin JPF DT&E. (ECD: FY96) ($6384)
(U) - Begin build of JPF IOT&E hardware. (ECD: FY96) ($1436)

Program Element: 0604602F
PE Title: Armament/Ordnance Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Work Performed By: Aeronautical Systems Center, Projects Division, Conventional Munitions Program Office (ASC/YHP) at Eglin AFB, FL, manages this project. Support contractors are: TEAS: Sverdrup Technologies, Tullahoma, TN; and TEAMS: RMS Technologies, Inc., Marlton, NJ. The contractor for the JPF is Motorola Inc., Scottsdale, AZ.

(U) Related Activities:
(U) - PE 0604618F and PE 0604618N, Joint Direct Attack Munition
(U) - There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3020, Weapon Procurement, AF; Budget Activity 6, Guided Bombs and Missiles; Program Title: Joint Programmable Fuze								
0	0	0	0	4151	6275	8676	TBD	TBD

(U) International Cooperative Agreements: Not Applicable

(U) Project 4003, Adverse Terrain Ammunition Assembly Trailer/Adverse Terrain Tow Vehicle (ATAAT/ATTV): This project will develop a munitions assembly trailer capable of transporting and assembling munitions in support of aircraft sortie generation at damaged or base airfields.

(U) FY 1993 Accomplishments:
(U) - Began ATAAT development. (ECD: TBD) ($790)

(U) FY 1994 Plans:
(U) - Continue ATAAT development. (ECD: TBD) ($497)

Program Element: 0604602F
PE Title: Armament/Ordnance Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) FY 1995 Plans:
(U) - Program transfers to Project 2784, MMHE. (ECD: TBD)

(U) Work Performed By: Aeronautical Systems Center (ASC/ALZ) at Eglin AFB, FL, manages this project. Support contractors are: Technical Engineering Acquisitions Support (TEAS): Sverdrup Technologies, Tullahoma, TN; and Technical Engineering Acquisition Management Support (TEAMS): Information and Systems Network Corporation, Bethesda, MD. North American Dynamics, Tustin, CA, was the contractor on the SBIR contractor for the ATAAT program.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable

(U) International Cooperative Agreements: Not Applicable

(U) Project 5613, Containers: This project funds the operation of the tri-service Container Design Retrieval System (CDRS). This system includes the maintenance of a container database to preclude proliferation and duplication of munitions containers. It also supports organic containers design, prototyping, and testing capabilities. This projects efforts are limited to the study, design, and development of containers systems. Any procurement will be performed and funded by the applicable weapons system project.

(U) FY 1993 Accomplishments:
(U) - Initiated/continued/completed design/development of various CDRS projects, including completing initial design of the BLU-113 pallet,. the AGM-130 charge couple device seeker container, and the AGM-142 rocket motor and warhead containers. ($365)
(U) - Provided engineering management support for the delivery of MILSTAR Contingency Terminal Container Sets (CTCS). (ECD: FY93) ($50)
(U) - Converted the CDRS database to PC. (ECD: FY93) ($700)

Program Element: 0604602F **Date:** February 1994
PE Title: Armament/Ordnance Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) FY 1994 Plans:
(U) - Initiate/continue/complete design/development of various CDRS projects, including beginning design of Universal GBU-15/AGM-130 all-up-round (AUR) container and the single pack, AUR Joint Standoff Attack Weapon (JSOW) container. ($641)
(U) - Provide engineering management support for the delivery of MILSTAR Contingency Terminal Container Sets (CTCS). (ECD: FY94) ($50)
(U) - Operate and improve the CDRS database. (ECD: FY94) ($700)

(U) FY 1995 Plans:
(U) - Initiate/continue/complete design/development of various CDRS projects, including completing development of the GBU-15/AGM-130 AUR container and the single pack, AUR JSOW container. ($13)
(U) - Operate the CDRS database. (ECD: FY94) ($190)

(U) Work Performed By: Aeronautical Systems Center, Packaging and Transportation Division, Conventional Munitions Program Office (ASC/YHP) at Eglin AFB, FL, manages this project.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: # 0604604F **Date:** February 1994
PE Title: Submunitions
Budget Activity: #5 Engineering & Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

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

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
3166 Joint Smart Munitions Test and Evaluation Program								
7,063	3,796	3,612	6,979	6,232	6,791	7,313	Cont	TBD
1015 Wind Corrected Munitions Dispenser Kit								
0	0	21,468	23,727	35,615	23,330	0	TBD	TBD
1015 Sensor Fuzed Weapon Production Program Support								
0	0	1,600	1,600	1,400	1,400	1,460	3,600	11,060
Total								
7,063	3,796	26,680	32,306	43,247	31,521	8,773	TBD	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element consists of three projects but the funds are reflected in only two, a joint smart munition test and evaluation project, and a project to develop a wind corrected munition dispenser kit. The test and evaluation project is a joint US Air Force/US Army effort to evaluate developmental smart munitions and related emerging technology with applications against ground vehicle targets and Theater Air Defense (TAD) units. The wind corrected munition dispenser project develops a guidance kit for munition dispensers that provides inertial navigation to compensate for ballistic errors caused by wind when these munitions are released from medium to high altitudes.

C. (U) JUSTIFICATION OF PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

Program Element: # 0604604F
PE Title: Submunitions
Budget Activity: #5 Engineering & Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Project 3166, Joint Smart Munitions Test and Evaluation Program: This project, commonly known as "Chicken Little", is a joint US Air Force/US Army project which evaluates developmental smart munitions and related emerging technology with applications against mobile ground vehicle targets and Theater Air Defense units by determining antiarmor/counter-battery munition performance against actual foreign targets in realistic environments and in the presence of countermeasures. Data gathered is used to meet developmental decision points requiring highly reliable, realistic performance data. The project is a major focal point for joint Air Force and Army target signature collection and dissemination for development and exploitation purposes.

(U) FY 1993 Accomplishments:

(U) - Continued Phase III of the weapon effectiveness evaluation program with focus on countermeasures ($4,100)

(U) - Conducted an extended term Captive Flight Tests (CFT) at Camp Grayling MI to support the BAT Project Office, Comanche program office, Small Target Activated Fire-and-Forget (STAFF) program office, Longbow Project Manager's Office, and the Foreign Science and Technology Center ($1,000)

(U) - Initiated a test and analysis effort to determine the response of electrical components to fragment damage ($200)

(U) - Conducted a vulnerability analysis of the SA-6, SA-8, and SA-13 for the Sensor Fuzed Weapon (SFW) program office ($200)

(U) - Produced a time-out-of-action study on the SA-6 and SA-8 for the HARM program ($300)

(U) - Supported the Sensor Fuzed Weapon (SFW) Production Transition Program. Also, in conjunction with the Joint Standoff Weapon (JSOW) program office and the Wright Labs examined SFW performance using an alternate Insensitive High Explosive (IHE) fill ($300)

(U) - Collected Dual band Millimeter Wave (MMW) and infrared (IR) signatures on a M-109 Howitzer, ZSU 23-4 and a classified exploitation vehicle ($400)

(U) - Continued support of the Target and Background Information Library System (TABILS) for databasing target/background signatures and National Armor/Anti-Armor Data Repository (NADR) for databasing warhead lethality and vehicle survivability information ($600)

(U) FY 1994 Planned Program:

(U) - Continue Phase III of the weapon effectiveness evaluation program with focus on countermeasures ($1,600)

Program Element: # 0604604F
PE Title: Submunitions
Budget Activity: #5 Engineering & Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Continue seeker/sensor evaluation and analysis with emphasis on product improvement. Select the next generation of seeker /sensors and warheads for evaluation and continue to conduct captive flight tests ($1,000)
(U) - Continue warhead effectiveness tests and support to AF and Army program offices ($200)
(U) - Continue vulnerability analysis of new targets, including specific Suppression of Enemy Air Defenses (SEAD) and critical mobile targets for SFW and Silent Hard Kill (SHARK) programs ($200)
(U) - Measure and document signatures of threat vehicles to support Theater Missile Defense (TMD) and SEAD targeting and identification analyses ($300)
(U) - Continue support of Joint Tactical Coordinating Group (JTCG) and AF/Army program offices in signature collection/analysis and simulator validation ($100)
(U) - Provide modeling and analysis support for simulated battlefield conditions ($200)

(U) FY 1995 Planned Program:
(U) - Complete Phase III of the weapon effectiveness evaluation and initiate planning for Phase IV the program ($2,000)
(U) - Select the next generation of seeker/sensors and warheads for evaluation and start Captive Flight Tests (CFT) evaluations and analyses ($1,000)
(U) - Initiate new warhead effectiveness tests in support of AF and Army program offices and start vulnerability analysis of new targets ($200)
(U) - Develop smart weapons models and simulations for digitized battlefields ($400)

(U) Project 1016 Sensor Fuzed Weapon Production Program Support: This project provides technical and management support for the Sensor Fuzed Weapon (SFW) production program. This effort was previously funded in Other Procurement Air Force (PE 28030F).

(U) FY 1993 Planned Program:
(U) - Funded in Other Procurement Air Force

(U) FY 1994 Planned Program:
(U) - Funded in Other Procurement Air Force

Program Element: # 0604604F
PE Title: Submunitions
Budget Activity: #5 Engineering & Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) FY 1995 Planned Program:
(U) - Provides technical, management, and administrative support for the SFW production program ($1,600)

(U) Work Performed By: Program management is provided by the Air Force Development Test Center (AFDTC), Eglin AFB FL. Program office is jointly manned by Army and Air Force personnel. Contractors include The Analytic Sciences Corp., Reading MA and Sverdrup Corp., TEAS Group, Niceville, FL.

(U) Related Activities:
(U) PE 0604607F, Wide Area Antiarmor Munitions (Sensor Fuzed Weapon)
(U) PE 0603628A, Field Artillery Ammunition Development
(U) PE 0604631A, Field Artillery Ammunition
(U) PE 0605805A, Munitions Standardization, Effectiveness and Safety
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense

(U) Other Appropriation Funds:

Appropriation 3080/3020, Budget Activity #5, Program Title: SFW production

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
17,1749	86,856	109,231	172,790	271,163	299,186	278,006	164,100	1,522,900
22	112	260	526	970	1204	1134	674	5000

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: # 0604604F
PE Title: Submunitions
Project Number: 1015
Budget Activity: #5 Engineering & Manufacturing Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

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

	FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
1015 Wind Corrected Munitions Dispenser Kit	0	0	21,468	23,627	35,615	23,330	0	TBD	TBD

B. (U) DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops a guidance kit for the CBU-87/B, CBU-89/B, and the CBU-97/B dispensers that provides inertial navigation to compensate for ballistic errors caused by wind when these munitions are released from medium to high altitudes. Dispenser weapons modified with this kit will have improved effectiveness for both bombers and fighters. This guidance kit will provide Air Force the capability to accurately deliver inventory dispenser weapons from medium and high altitudes. This program is a new start and a separate PE has been requested.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program: Not Applicable

2. (U) FY 1994 Planned Program: Not Applicable

3. (U) FY 1995 Planned Program:
   (U) - Award EMD Contract. Conduct Design Review ($8,000)
   (U) - Test Hardware Fabrication ($8,500)
   (U) - Aircraft Integration Planning ($3,000)
   (U) - Wind Tunnel Tests ($2,000)

4. (U) Program to Completion:

Program Element: # 0604604F
PE Title: Submunitions

Project Number: 1015
Budget Activity: #5 Engineering & Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Complete Testing ($ TBD)
(U) - Complete Aircraft Integration ($ TBD)
(U) - Complete EMD ($ TBD)
(U) - Production Transition ($ TBD)

D. (U) WORK PERFORMED BY: TBD -- the program starts in FY95

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY: Not Applicable

F. (U) PROGRAM DOCUMENTATION:

(U) - Adverse Weather Precision Guided Munitions Mission Need Statement (TAF 401-91), 15 Mar 92
(U) - Joint Operational Requirements Document for Joint Direct Attack Munition (JDAM), 13 May 1993 (S)
(U) - System Operational Requirements Document for Sensor Fuzed Weapon, 6 Nov 1991 (S)

G. (U) RELATED ACTIVITIES: Not Applicable

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):
Appropriation 3020, Budget Activity #5, Program Title: WCMD Kit production (PE 27165)

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
0	0	0	0	0	16,808	25,952	TBD	TBD
0	0	0	0	0	TBD	TBD	TBD	TBD

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable

J. (U) MILESTONE SCHEDULE:

1. (U) EMD Start/Contract Award FY 95/2
2. (U) Full Rate Production FY 99

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604609F
PE Title: Reliability and Maintainability Technology Insertion Program (RAMTIP)
Budget Activity: #5 Engineering & Manufacturing Development
Old Budget Activity: #6-Defense Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

	FY93 Actual	FY94 Estimate	FY95 Estim	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
663263, Reliability and Maintainability Technology Insertion Program (RAMTIP)									
	21,692	18,693	8,804	8,928	8,723	9,100	9,525	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: RAMTIP was initiated by the AF Chief of Staff to improve the reliability and maintainability of fielded, in-production, and future USAF systems. RAMTIP provides funding to accelerate development and transition of emerging, high-leverage technologies from the laboratory to the implementation phase. RAMTIP is a "level-of-effort" program focused on developing technologies that alleviate pervasive reliability and maintainability problems within the Air Force and DoD. RAMTIP has 20 active projects with a proven return on investment of 16 to 1. Average project lengths is thirty-six months. Particular emphasis is placed on implementing techniques to migrate RAMTIP products across multiple weapon systems to leverage cost and availability improvements. The success of RAMTIP projects is dependent upon MAJCOMs and field support to adapt technology once the initial investment is completed. Listed below are projects underway as identified by the Air Force Materiel Command (AFMC) Technology Master Process (TMP). The objective of the TMP is to strategically focus technology application/insertion for the Air Force's current and future needs. The category of research being performed in this PE is Engineering and Manufacturing Development because projects are being engineered for service use.

Program Element: #0604609F
PE Title: Reliability and Maintainability Technology Insertion Program (RAMTIP)
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #6-Defense Wide Mission Support

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) FY 1993 Accomplishments:
(U) - Digital Map System (DMS) implemented as a form, fit, function "plus" replacement for the existing F-15E Remote Map Reader (RMR). The DMS is expected to increase MTBF (Mean Time Between Failure) from 100 to 2,000 hrs ($1,000)
(U) - Testable and Monitorable Modular Mission Computer (TAM-MMC) development was initiated with the aim of providing on-board hardware testability and non-intrusive real-time software monitoring. TAM-MMC is being designed to support two levels of maintenance and with the capability of detecting 98% of faults ($0.500)
(U) - Completed development of Frameless Aircraft Transparencies and Laser Automated Decoating ($4,200)
(U) - Awarded contracts for laser ultrasonic inspection and back-up power fuel cell ($1,500)
(U) - Completed breadboard design for Miniature Fiber Optic Gyro development ($1,000)
(U) - Completed functional configuration audit for universal water activated release system and reviewed sources for thin dense chrome bearings ($1,000)
(U) - Completed critical design review for advanced RF receiver packaging and airframe battery ($4,700)
(U) - Initiated development of advanced fiber optic connector and erosion resistant coating for Infrared windows ($1,000)
(U) - Completed preliminary design review for random agile de-interleaver and electronic flight controls ($4,800)
(U) - Completed hardware/software integration for subassembly redundancy system ($2,000)

(U) FY 1994 Plans:
(U) - Critical Design Review for DMS,TAM-MMC and laser ultrasonic inspection system ($8,100)
(U) - Complete qualification and pre-flight test review of advanced maintenance-free aircraft battery for E-8, F-22, B-52 and others. Anticipate substantial increase for MTBF ($1,000)
(U) - Begin full-scale testing of thin dense chrome bearings to reduce corrosion and increase endurance in engines on F-16, B1-B, KC-135 and others ($1,300)
(U) - Install electric actuators on C-141 to replace central hydraulic system on cargo aircraft including C-5 and KC-135 ($4,000)
(U) - Begin radiation hardening of mature microelectronics to increase reliability of satellite computers while retaining commercial software tools for GPS and MILSTAR ($1,500)
(U) - Begin advanced hybrid oxygen system to eliminate oxygen tanks on C-9, airlifters, Army and Navy systems ($0.793)

Program Element: #0604609F **Date:** February 1994
PE Title: Reliability and Maintainability Technology Insertion Program (RAMTIP)
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #6-Defense Wide Mission Support

(U) - Continue work on universal water activated release system, advanced fiber optic connector, erosion-resistant coating for IR windows and random agile de-interleaver ($2,000)

(U) FY 1995 Plans:
(U) - Flight test electric actuators on C-141 and install/ground-test F-15 map reader ($5,000)
(U) - Deliver prototype TAM-MMC ($2,200)
(U) - Complete thin dense chrome bearings, erosion resistant infra-red windows and laser ultrasonic inspection system projects ($1,000)
(U) - Complete design of advance hybrid oxygen system ($0.600)
(U) - Given funding required for continuation of on-going projects, it is highly unlikely any new projects will be intiated during FY95. However, the TMP will review needs and funding during 2nd Qtr FY94 to consider future projects. The TMP will identify projects most in need of funding with the highest payback in terms of operational capability, reliability and maintainability improvement, and cost. Program will re-baseline with reduced funding.

(U) Work Performed By: The RAMTIP Program Office is part of the Technology Transition Office (AFMC) located at Wright-Patterson AFB, OH. Other organizations involved are: HQ USAF, HQ AFMC, product centers, logistics centers and laboratories. The largest participating contractors are McDonnell-Douglas, St Louis MO; Lockheed-Fort Worth, Fort Worth TX; and Lockheed Aeronautical Systems Company, Marietta GA.

(U) Related Activities:
(U) - Productivity, Reliability, Availability & Maintainability Program (PE 0708026F).
(U) - All RAMTIP projects are closely coordinated with the AF laboratories to preclude duplication of effort and to take advantage of technology advances emanating from the laboratory environment.
(U) - All RAMTIP projects are reviewed for potential Army/Navy interest, and dialogue is established in cases where commonality of problems exist such that solutions become DoD-wide.
(U) - There is no duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands): Not Applicable

Program Element: #0604609F
PE Title: Reliability and Maintainability Technology Insertion Program (RAMTIP)
Budget Activity: #5 Engineering and Manufacturing Development
Old Budget Activity: #6-Defense Wide Mission Support

Date: February 1994

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Date: February 1994

Program Element: #0604617F
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

A. (U) RESOURCES ($ In Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2621 Rapid Runway Repair								
6,116	3,538	1,705	1,008	617	25	0	0	13,395
2895 Air Base Operability								
5,060	6,431	6,729	9,845	3,380	4,390	8,575	Cont	TBD
3141 Camouflage, Concealment, and Deception								
1,126	575	788	1,835	2,270	6,015	4,270	Cont	TBD
4057 Survivable Airbase Utility Systems								
504	310	45	1,895	2,475	1,960	60	Cont	TBD
4058 Advanced Firefighting								
94	58	313	325	13	0	0	0	803
Total								
12,900	10,912	9,580	14,908	8,755	12,390	12,905	Cont	TBD

Program Element: #0604617F **Date: February 1994**
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program is under Budget Activity #5 because it contains projects funded by appropriation 3600, research and development category 6.5, which supports Engineering and Manufacturing Development (EMD) of selected air base operability (ABO) systems. Sustained airfield operations are a prerequisite for a successful air campaign. Base and theater commanders must have the capability and resources to defend their main or forward airfields and to return them to operational status after sustaining an attack.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

(U) Project 2621, Rapid Runway Repair (RRR): This full-scale development program develops the technology, procedures, and equipment to rapidly repair large, deep craters in runways and taxiways as well as smaller, pothole-sized craters caused by enemy munitions.

(U) FY 1993 Accomplishments: ($7,188)
(U) - Continued EMD of the Deployable Pavement Repair System (DPRS) - formerly called Automatic Spall Repair System. (NSP) (4QFY95)
(U) - Completed development of Repair Quality Criteria (RQC) for the KC-135. (NSP) (Mar 93)

(U) FY 1994 Plans:
(U) - Initiate development of RQC for the KC-10, B-52, and C-17 aircraft. ($2,495K) (1Q, 2Q, 3QFY94)
(U) - Complete EMD on Mat Anchoring . ($163K) (1QFY94))
(U) - Complete EMD of the DPRS. ($880K) (4QFY95)

(U) FY 1995 Plans:
(U) - Initiate RQC development for the C-9. ($800K) (2QFY95)

Program Element: #0604617F **Date: February 1994**
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) - Support production contract for MAT anchoring. ($25K) (2QFY95)
(U) - Continue EMD of the DRPS. ($880K) (4QFY98)

(U) Program to Completion: N/A, continuing program.
(U) - Initiate RQC development for CRAF and B-1B. ($650K) (1QFY96)
(U) - Support production contract for MAT anchoring. ($25K) (1QFY96)
(U) - Support production contract for the DPRS. ($25K) (2QFY96)
(U) - Continue updates of the Worldwide ABO Threat Compendium. ($308K) (Continuing)

(U) Work Performed By: Program contractor is BDM MSC, Panama City FL. In-house development organizations responsible for elements of the program are the Air Force Weapons Laboratory, Kirtland AFB NM and Aeronautical Systems Center, Eglin AFB FL.

(U) Related Activities:
(U) - Program Element #0602206F, Civil Engineering & Environmental Quality Assurance.
(U) - Program Element #0603307F, Air Base Operability Advanced Development.
(U) - Program Element #0603723F, Civil/Environmental Engineering Technology.
(U) - Program Element #0207596F, Base Operations, Tactical Air Forces.
(U) - Program Element #0401896F, Base Operations.
(U) - Program Element #0702896F, Base Operations (Logistics).
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0604617F
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, Vehicles								
0	3,217	0	0	0	0	0	Cont	TBD
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, RRR Equipment								
0	2,281	1,569	3,764	5,403	6,750	0	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

(U) Project 2895, Air Base Operability: Air Base Operability integrates operational concepts to improve sortie generation capability when an attack occurs on or close to an air base.

(U) FY 1993 Accomplishments:
(U) - Completed Contingency Airfield Lighting System (CALS) EMD and Initial Operational Test & Evaluation (IOT&E). ($839K) (Jul 93)
(U) - Continued DEM/VAL for a Mobile Ordnance Disrupter System (MODS). ($3,284K) (Aug 93)
(U) - Continued EMD on the Base Recovery Communication system (BRCS). ($785K) (Sep 95)
(U) - Continued updates of the Worldwide ABO Threat Compendium. ($452K) (Continuing)

(U) FY 1994 Plans:
(U) - Support CALS production contract. ($296K) (4QFY94)
(U) - Continue DEM/VAL of MODS. ($3,688K) (4QFY94)
(U) - Initiate P3I effort and support production contract for BRCS. ($1,696K) (1QFY94)

Program Element: #0604617F
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Continue update of the Worldwide ABO Threat Compendium. ($205K) (Continuing)
(U) - Begin EMD of the Explosive Ordnance Disposal (EOD) Medical Protective Shield. ($546K) (2QFY94)

(U) FY 1995 Plans:
(U) - Support CALS production and deployment. ($475K) (4QFY95)
(U) - Award EMD Contract for the MODS. ($3,224K) (3QFY95)
(U) - Continue P^3I effort and support production contract for BRCS. ($1,650K) (Sep 98)
(U) - Continue updates of the Worldwide ABO Threat Compendium. ($280) (Continuing)
(U) - Continue EMD of the EOD Medical Protective Shield. ($350K) (Sep 96)
(U) - Award EMD contract for the Armored Multi-Role Vehicle (ARMRV). ($750K) (1QFY95)

(U) Program to Completion: N/A, continuing program.

(U) Work Performed By: Program contractors are Sumaria Systems Inc., Wakefield MA for BRCS; Multi-Electric, Chicago IL for CALS. In-house development organizations responsible for elements of the program are Electronic Systems Center, Hanscom AFB MA; Aeronautical Systems Center, Wright-Patterson AFB OH; and Aeronautical Systems Center, Eglin AFB FL.

(U) Related Activities:
(U) - Program Element #0603307F, Air Base Operability Advanced Development.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0604617F
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, Vehicles								
0	0	0	0	2,063	4,209	8,777	Cont	TBD
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, Communications								
0	8,471	7,475	6,459	5,049	2,079	0	Cont	TBD
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, MODS, CALS, & EOD								
2,833	6,971	0	340	2,500	12,084	15,384	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

(U) Project 3141, Camouflage, Concealment, And Deception (CCD): This project embraces the full spectrum of camouflage, concealment, and deception methods to mitigate the effectiveness of enemy attacks against air bases.

(U) FY 1993 Accomplishments:
(U) - Continued Engineering and Manufacturing Development (EMD) of a Multi-Spectral (visual and infrared) Smoke Generator. ($1,126K) (4QFY94)

(U) FY 1994 Plans:
(U) - Complete EMD for the Multi-Spectral Smoke Generator. ($200K) (4QFY94
(U) - Initiate and finalize EMD of Multi-Spectral Aircraft Decoys. ($375K) (2QFY94)

Program Element: #0604617F **Date: February 1994**
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) FY 1995 Plans:
(U) - Initiate EMD on Multi-Spectral Nets. ($388K) (1QFY95)
(U) - Initiate EMD on Vertical Smoke and Obscurants. ($400K)

(U) Program to Completion: N/A, continuing program.

(U) Work Performed By: Prime Contractor is Ball Corp, San Diego CA for CCD Systems. In-house development organizations responsible for the program are Aeronautical Systems Center, Wright Patterson AFB OH and Aeronautical Systems Center, Eglin AFB FL.

(U) Related Activities:
(U) - Program Element #0603307F, Air Base Operability Advanced Development.
(U) - Program Element #0102896F, Base Operations, Defensive
(U) - Program Element #0207595F, Base Communications, Tactical Air Forces
(U) - Program Element #0207596F, Base Operations, Tactical Air Forces.
(U) - Program Element #0208028F, Contingency Operations Program
(U) - Program Element #0401896F, Base Operations.
(U) - Program Element #0702896F, Base Operations (Logistics).
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, CCD								
4,345	3,671	1,808	3,901	710	975	2,180	Cont	TBD

Program Element: #0604617F **Date: February 1994**
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) International Cooperative Agreements: Not Applicable.

(U) Project 4057, Survivable Air Base Utility Systems (SABUS): This project will provide Rapid Utility Repair Kits (RURK) designed specifically for each utility type: Petroleum, Oils, and Lubricants (POL); electrical-interior; electrical-exterior; and water/sewerage.

(U) FY 1993 Accomplishments:
(U) - Continued support of production contract for POL RURK, Phase I. ($73K) (4QFY99)
(U) - Continued EMD of POL RURK, Phase II. ($431K) (4QFY96)

(U) FY 1994 Plans:
(U) - Continue support of production contract for POL RURK, Phase I. ($40K) (4QFY99)
(U) - Continue EMD of POL RURK, Phase II. ($270K) (4QFY95)

(U) FY 1995 Plans:
(U) - Continue support of production contract for POL RURK, Phase I. ($20K) (4QFY99)
(U) - Support production contract for POL RURK, Phase II. ($25K) (1QFY95)

(U) Program to Completion: N/A, continuing program.

(U) Work Performed By: Program Contractors are BDM Corporation, Panama City FL and Idaho National Engineering Laboratories Idaho Falls ID. In-house development organizations responsible for the program are the Air Force Weapons Laboratories, Kirtland AFB NM, and Aeronautical Systems Center, Eglin AFB FL.

(U) Related Activities:
(U) - Program Element #0602206F, Civil Engineering & Environmental Quality Assurance.
(U) - Program Element #0603307F, Air Base Operability Advanced Development.

Program Element: #0604617F
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Program Element #0603723F, Civil/Environmental Engineering Technology.
(U) - Program Element #0207596F, Base Operations, Tactical Air Forces.
(U) - Program Element #0401896F, Base Operations.
(U) - Program Element #0702896F, Base Operations (Logistics).
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, POL RURK								
8,649	2,205	1,435	3,175	0	0	3,067	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

(U) Project 4058, Advanced Firefighting: This project will design, test and evaluate vehicle hardening kits and enhance the capability of War Reserve Materiel fire fighting vehicles to include off-road capability. This project will also provide a Deployable Fire Protection System and develop a training program.

(U) FY 1993 Accomplishments:
(U) - Initiated EMD on a Deployable Fire Protection System: ($94K) (Dec 93)

(U) FY 1994 Plans:
(U) - Prepare for EMD contract for the Deployable Fire Protection system. ($58K) (2QFY94)

Program Element: #0604617F **Date: February 1994**
PE Title: Air Base Operability
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) FY 1995 Plans:
(U) - Award EMD contract for the Deployable Fire Protection system. ($313K) (2QFY95)

(U) Program to Completion: N/A, continuing program.

(U) Work Performed By: Prime contractor is to be determined. In-house development organizations responsible for the program are the Air Force Weapons Laboratories, Kirtland AFB NM and Aeronautical Systems Center, Eglin AFB FL.

(U) Related Activities:
(U) - Program Element #0602206F, Civil Engineering & Environmental Quality Assurance.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, BA #4, Other Base Maintenance and Support Program, Advanced Firefighting								
0	0	0	900	1,000	1,000	1,000	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: # 0604618F
PE Title: Joint Direct Attack Munitions
Project Number: 3890
Date: February 1994
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Project Title: Joint Direct Attack Munitions

NO PICTURE AVAILABLE BECAUSE OF THE EARLY STAGE OF THE PROGRAM.

POPULAR NAME: JDAM

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands)

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones		MS I: Oct		MS II: Oct			MS III: Jul	
Engineering Milestones			CDR: Aug PRR1: Sep		PRR2: Mar			
T&E Milestones				DT: Nov	OT: Mar			
Contract Milestones		Two Contracts EMD Ph 1 (compet. dev/mfg): Apr		Downselect for EMD Ph 2 One Contractor: Oct		LRIP I: Oct	LRIP II: Oct	FRP: Oct 00

Program Element: # 0604618F
PE Title: Joint Direct Attack Munitions

Project Number: 3890
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

BUDGET ($000)	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	Budget Total (To Complete)
Major Contract	9,558	27,700	50,700	72,300	65,873	50,814	42,373	TBD
Support Contract	5,370	4,509	4,709	5,000	2,500	2,000	2,000	TBD
In-House Support	5,308	16,513	25,600	15,500	27,607	8,177	3,279	TBD
GFE/Other	2,312	25,943	3,986	4,834	10,766	11,577	3,685	TBD
Total	22,548	74,665	84,995	97,634	106,746	72,568	51,337	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: Operation Desert Storm confirmed the need for a more accurate weapon delivery capability in adverse weather conditions and from medium/high altitudes. Failure to satisfy this requirement will allow the enemy to continue to take advantage of the sanctuary of weather and/or prevent US air power from prosecuting a conflict on its terms. JDAM is an Air Force and Navy munitions program to correct these shortfalls, with the Air Force as the executive service. JDAM will upgrade the existing inventory of general purpose bombs (MK 84, BLU-109/B, and MK 83) by integrating them with a guidance kit consisting of a global positioning system aided inertial navigation system (INS/GPS). JDAM will provide an accurate (defined as not more than 13 meters) adverse weather capability. The program will incorporate, where feasible, INS/GPS commonality with the Joint Standoff Weapon (JSOW) program managed by the Navy. JDAM will initially be integrated with the B-2, B-1B and F/A-18C/D aircraft with follow-on integration on the F-16, F-15E, F-22 and other aircraft. The JDAM Product Improvement Program (PIP) will field improvements to the JDAM system, with initial emphasis on attaining precision (3 meters or less) accuracy through non-seeker and seeker initiatives. JDAM development will proceed in a two-phased Engineering and Manufacturing Development (EMD) effort. EMD Phase I will emphasize competitive design and manufacturing processes. EMD Phase II will emphasize full scale hardware build and flight test to verify system performance and

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will also support OT&E. The RDT&E Research Category for this program is 6.5, EMD, as approved at the latest DAB on 1 October 1993 and therefore is funded in Budget Activity 5.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS ($ in Thousands):

1. (U) FY 1993 Program:
   - (U) - Began COEA and other pre-development activities (ECD: FY 94). ($14,400 (includes $6,000 for EMD Phase 1 which will occur in FY 94))
   - (U) - Began JDAM aircraft interface definition. B-1B, B-2, and F/A-18C/D will be primary aircraft (ECD: FY 99); others to follow. ($5,100)
   - (U) - Began precision guidance Concept Exploration studies evaluating both seeker and non-seeker options (ECD: FY94). ($3,100)

2. (U) FY 1994 Planned Program:
   - (U) - Begin competitive design and manufacturing processes phase of Engineering and Manufacturing Development (EMD Phase 1) with two contractors (ECD: FY 95). ($53,300)
   - (U) - Complete precision guidance Concept Exploration studies. Begin concept demonstrations of Differential GPS. Targeting/Mission Planning for precision weapons, Millimeter Wave (MMW) and Synthetic Aperture Radar (SAR) seekers for precision guidance (ECD: FY 97). ($3,300)
   - (U) - Continue JDAM aircraft interface definition and development support activities (ECD: FY99). ($18,100)

3. (U) FY 1995 Planned Program:
   - (U) - Conduct wind tunnel tests of both contractors hardware (ECD: FY 95). ($14,700)
   - (U) - Complete EMD Phase 1, including building and testing EMD Phase 1 DT&E test hardware, such as engineering evaluation units, instrumented measurement vehicles, laboratory test guidance kits, separation test vehicles, and guided test vehicles (ECD: FY 95). ($58,300)
   - (U) - Continue the Differential GPS and Targeting/Mission Planning concept demonstrations (ECD: FY 97). ($4,500)
   - (U) - Continue the MMW and SAR seeker concept demonstrations (ECD: FY 97). ($7,500)

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4. (U) Program to Completion:
   (U) - Complete Engineering and Manufacturing Development (ECD: FY 99) and Product Improvement Program (PIP) (ECD: TBD).
   (U) - Complete JDAM (ECD: FY 17; PIP ECD: TBD) production programs.
   (U) - Complete JDAM integration on all designated aircraft (ECD: TBD).
   (U) - Complete weapon deployment (ECD: TBD).

D. (U) WORK PERFORMED BY: The JDAM System Program Director, Aeronautical Systems Center (ASC/YH-2), Eglin AFB FL, manages the JDAM program for the AF Program Executive Officer for Conventional Strike (AFPEO/TS). JDAM will start with two contractors in April 1994 and downselect to one contractor in October 1995 to continue EMD. The aircraft prime contractors, under direction from the aircraft SPOs, will perform the weapon/aircraft integration. For the JDAM PIP, four contracts were awarded in February 1993 to evaluate various concepts for precision accuracy. These contracts were awarded to the following companies: Coleman Research Corporation, Orlando FL; Nichols Research Corporation, Huntsville AL; SRI International, Menlo Park CA; and The Analytical Sciences Corporation (TASC), Reading MA and Fort Walton Beach FL.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Added MK 83 1,000-pound warhead for the F-22. Accelerated B-2 flight testing start from FY 1998 to FY 1996. The JDAM-3 program has evolved into the JDAM Product Improvement Program to broaden its scope to look at a variety of potential JDAM improvements, and their orderly introduction, as opposed to a former much narrower focus of gaining precise accuracy under the JDAM-3 effort using seekers exclusively.

2. (U) SCHEDULE CHANGES: Milestone I slipped from June 1993 to October 1993, EMD Phase 1 contract award from November 1993 to April 1994 and Milestone II from September 1995 to October 1995. These date changes were caused by several program restructurings and change from an originally planned Milestone I/II review. To provide early test assets for B-2 integration additional test articles were included in EMD, thus causing a three month slip in both Low Rate Initial Production (LRIP) I to 1st Qtr FY 1998 and LRIP II to 1st Qtr FY 1999. Because one of the three planned LRIP buys was

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displaced by an additional DT&E asset buy to support the earlier B-2 requirement, the Full Rate Production (FRP) start has advanced nine months to 1st Qtr FY 2000. IOC was unaffected by these changes and remains 1st Qtr FY 2000.

3. (U) COST CHANGES: Reprogramming actions and other assessed reductions in FY 1993 were made commensurate with the delay in the program start, decreasing the appropriated amount of $30.1M to $21.6M. RDT&E funding decreased in FY 1995 and the out years, to reflect re-definition and re-structuring of the former JDAM-3 program into a JDAM Product Improvement Program. This was tempered somewhat by the addition of funding in FY 1997, FY 1998, and FY 1999 to accommodate the accelerated B-2/JDAM integration and testing. RDT&E funding for the start of EMD Phase II was realigned from FY 1995 to FY 1996. The first year of production funding changed from FY 1996 (long lead) to FY 1998 due to elimination of long lead procurement from the program, and the acceleration of B-2 integration requiring more EMD test assets.

F. (U) PROGRAM DOCUMENTATION:

(U) - SAC/TAF Mission Need Statement #401-91, 5 Mar 92.
- (U) - Joint CAF/USN Operational Requirements Document, CAF-401-91-A, 13 May 93 (CONFIDENTIAL).

G. (U) RELATED ACTIVITIES:

(U) - JDAM integration with the following programs: Program Element (PE), PE 0604240F (B-2), PE 0604226F (B-1), PE 0604329F (F-22), PE 0207133F (F-16), and PE 0204162N (F/A-18).
(U) - PE 0604602F, Armament/Ordnance Development (Joint Programmable Fuze)
(U) - PE 0604727N, Joint Standoff Weapon System (JDAM Guidance Commonality)
(U) - PE 0604618N, Air to Surface Munitions (JDAM Integration on Navy Aircraft)
(U) - PE 0602602F and PE 0603601F (Low Cost INS/GPS and Seeker Technology Demonstration)
(U) - Joint Potential Designator: Joint
(U) - The JDAM program is a joint Air Force and Navy program with the Air Force as executive service. Management relationships and responsibilities are contained in the Air Force/Navy Memorandum of Agreement of June 1992. There is no unnecessary duplication of effort within the Air Force or Department of Defense.

Program Element: #0604618F
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H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands)

	FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
Appropriation: Weapons Procurement, Air Force (3020), Budget Activity: 4, Program Title: Joint Direct Attack Munitions									
$	0	0	0	0	0	64,905	66,757	3,713,238	3,844,900
Qty	0	0	0	0	0	(310)	(355)	(61,335)	(62,000)
SEEK EAGLE	0	0	0	0	15,735	3,418	0	0	19,153

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
None	None	None

T&E ACTIVITY (TO COMPLETION)

Event	Planned Date	Remarks
DT&E	1st Qtr/FY 1996	Start JDAM development testing
	3rd Qtr/FY 1996	First fully guided flight test
IOT&E	3rd Qtr/FY 1997	Start JDAM initial operational testing

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604703F
PE Title: Aeromedical/Casualty Care Systems Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2866 Aeromedical/Casualty Care Systems Development								
6,559	10,157	8,178	6,267	6,225	6,455	6,717	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program is under Budget Activity #5 because it contains projects funded by appropriation 3600, research and development category 6.5, which supports Engineering and Manufacturing Development (EMD) of systems for treatment, evacuation, and prediction of wartime casualties in a chemical or conventional warfare environment. Tactical, strategic, and covert aeromedical evacuation systems and medical treatment equipment are developed and fielded to meet unique Air Force medical readiness and operational requirements. Aerospace medical training systems are also developed and fielded to improve training of flight surgeons, flight nurses, medical technicians, and other medical personnel.

C. (U) JUSTIFICATION FOR PROJECT LESS THAN $10 MILLION IN FY 1995:

(U) Project 2866, Aeromedical/Casualty Care Systems Development: Provides engineering development, modification, qualification, test and evaluation, procurement, and support planning of medical equipment and systems for treatment, evacuation, and prediction of wartime casualties in a chemical or conventional warfare environment.

(U) FY 1993 Program:
(U) - Civil Reserve Air Fleet Aeromedical Evacuation Shipsets (CRAF AESS) - met system Initial Operating Capability (IOC). (NSP) (Dec 92)

Program Element: 0604703F
PE Title: Aeromedical/Casualty Care Systems Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Transportable Blood Transshipment Center (TBTC) - conducted critical component engineering tests. ($3,534K) (Oct 93)
(U) - Chemically Hardened Air Transportable Hospital (CHATH) - released Request for Proposal (RFP) for award of up to three Engineering and Manufacturing Development (EMD) contracts to prototype chemically/biologically hardened air management plants (CHAMP). ($2,390K) (Jan 93)
(U) - Spinal Cord Injury Transport System (SCITS) - prepared RFP for award of the EMD contract. ($112K) (Sep 93)
(U) - Aeromedical Equipment Evaluation (AMEE) - initiated test and evaluation of the Extra Corporeal Membrane Oxygenation (ECMO) system for C-9 flight certification. ($56K) (Jul 93)
(U) - Aerospace Medicine Training System (AMTS) - completed a study to define system requirements for EMD. (NSP) (Sep 93)
(U) - Threat Related Attrition (THREAT) - received Milestone II approval from the Designated Acquisition Commander (DAC) to enter EMD. (NSP) (Sep 93)
(U) - Integrated Management System - completed study ($215K) (Aug 93)
(U) - Field Medical Laser System (FMLS) - completed a requirements study for planning the EMD phase of program. ($160K) (Sep 93)
(U) - Alternating Current Interface Unit (ACIU) - awarded EMD contract for prototype development. ($92K) (Jul 93)

(U) FY 1994 Plans:
(U) - Civil Reserve Air Fleet Aeromedical Evacuation Shipsets (CRAF AESS) - complete shipset and spares delivery, meet Full Operational Capability (FOC) (NSP) (2 Qtr 94)
(U) - TBTC - conduct system critical design review (CDR) (Nov 93) and Development Test and Evaluation (DT&E) ($3,291K) (Aug 94)
(U) - CHATH - award contract for CHAMP prototype (Oct 93), prototype delivery/Functional Configuration Audit (FCA) ($3,210K) (Jul 94).
(U) - SCITS - award EMD contract for prototype development (Dec 94) and conduct Preliminary Design Review (PDR) ($2,111K) (Jun 94).
(U) - AMEE - complete test and evaluation of ECMO (Oct 93) and initiate test and evaluation of Critical Care Transport Team (CCTT) equipment. ($220K) (Oct 93)

Program Element: 0604703F **Date:** February 1994
PE Title: Aeromedical/Casualty Care Systems Development
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

(U) - THREAT - initiate system integration for Build 1 and design for ground attack module for Build 2 ($955K) (3 Qtr 94)
(U) - Alternating Current Interface Unit (ACIU) - conduct test and evaluation, finalize system design (Aug 94), and start production effort. ($55K) (May 94)
(U) - Continuous/Intermittent Suction Unit (CISU) - award EMD contract for prototype design. ($315K) (Jul 94)

(U) FY 1995 Plans:
(U) - Transportable Blood Transshipment Center (TBTC) - complete Operational Test and Evaluation (OT&E) and Functional Configuration Audit (FCA)/Physical Configuration Audit (PCA) (Dec 94), meet IOC (Jan 95), obtain Milestone III approval from DAC (Jan 95), and award production contract ($1,215K) (4 Qtr 95).
(U) - Chemically Hardened Air Transportable Hospital (CHATH) - down select best design at DT&E and exercise EMD option. ($3,189K) (1 Qtr 95)
(U) - Spinal Cord Injury Transport System (SCITS) - complete system CDR (2 Qtr 95) and complete DT&E ($2,448K) (4 Qtr 95).
(U) - Aeromedical Equipment Evaluation (AMEE) - complete testing of CCAT equipment. ($224K) (Oct 95)
(U) - Aerospace Medicine Training System (AMTS) - release RFP. ($79K) (2 Qtr 95)
(U) - Threat Related Attrition (THREAT) - complete qualification testing for Build 1 (2 Qtr 95), meet IOC (3 Qtr 95); and implement and test the ground attack module for Build 2. ($864K) (4 Qtr 95)
(U) - Wartime Medical Planning System (WAR MED PS) - obtain Milestone II decision from DAC and award EMD contract. ($55K) (Dec 94)
(U) - ACIU - complete production. (NSP) (1 Qtr 95)
(U) - CISU - obtain Milestone III decision and start production. ($104K) (1 Qtr 95)

(U) Program to Completion: N/A, continuing program.

(U) Work Performed By: Project is managed by the Aeromedical Systems Division, Human Systems Program Office, Human Systems Center (HSC), Brooks AFB, TX. The Aeromedical Research Function of Armstrong Laboratory at Brooks also provides in-house support for this program. The contractors are: E-Systems, Greenville TX; Arthur D. Little, Cambridge MA;

Program Element: 0604703F
PE Title: Aeromedical/Casualty Care Systems Development
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and BDM Int'l Corp., McLean VA. In-house developing organizations at Brooks AFB are the Operational Analysis Systems Division at HSC and the Aeromedical Function of the Armstrong Laboratory.

(U) Related Activities:
(U) - PE 0602202F, Human Systems Technology.
(U) - PE 0604501F, Nuclear, Biological and Chemical Warfare Defense.
(U) - PE 0603231F, Crew Systems and Personnel Protection Technology.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds:

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3080, Budget Activity #4, Other Base and Maintenance Support, Program Title Medical/Dental Equipment								
0	200	6,400	12,300	14,900	8,400	2,500	Cont	TBD

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604704F
PE Title: Common Support Equipment Development
Budget Activity: 5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: 4, Tactical Programs

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	TO Complete	TOTAL Program
652479, Common Support Equipment Development								
710	2,666	304	153	103	104	0	0	6,007
653759, Air Force Support Equipment Management								
761	700	693	701	689	729	773	0	6,579
653852, 60,000 Pound Capacity Aircraft Transporter Loader								
7,400	1,400	608	1,020	514	320	332	0	42,919
Total								
8,871	4,766	1,605	1,874	1,306	1,153	1,105	0	55,505

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element supports projects that develop, test, evaluate and field improved flight line support equipment (SE) to meet the operational needs of both Global Reach and Global Power forces which is not available through nondevelopmental item (NDI) and commercial off-the-shelf (COTS) acquisitions. Its goal is to limit proliferation; increase standardization; reduce the deployment footprint; and improve performance, availability, and reliability and maintainability; thereby reducing life cycle costs. Common SE is needed to minimize the operational and support burden imposed by the proliferation of weapon system unique SE. Common SE efforts reduce SE proliferation, assure maximum operational capability for the dollars invested, and reduce the SE burden for operational commands and supporting agencies. It supports the Air Force Office of Support Equipment Management (AFOSEM) objective to develop, support, distribute, and maintain products that improve Air Force support equipment (SE) acquisitions. It also supports studies that develop recommendations to improve the SE acquisition management processes. AFOSEM activities support the DoD Standardization and Specifications program objectives to decrease SE proliferation, increase systems standardization, and improve weapon systems

Program Element: 0604704F
PE Title: Common Support Equipment Development
Budget Activity: 5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: 4, Tactical Programs

Date: February 1994

interoperability. This program element also supports the development of an air transportable, transporter-type loader with the capability to accommodate six pallets or a Type V airdrop platform carrying 60,000 pounds in a single load. It will be the backbone of the Global Reach airlift 463L system and improve mobility deployment times for the present military and Civil Reserve Air Fleet (CRAF) as well as the C-17 aircraft. The category of research being performed in this PE is Engineering and Manufacturing Development (EMD) because projects have received Milestone II approval.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 652479, Common Support Equipment: This project develops and tests common SE to fill a continuing need for better combat effectiveness, lower life cycle costs, greater returns on investment, and increased SE standardization. The Advanced X-Ray System (AXES) effort will develop a rugged deployable, high resolution x-ray system. It integrates state-of-the-art x-ray technology for field level nondestructive inspection of structural flaws, foreign substances, and corrosion in inaccessible or otherwise undetected components of aircraft, engines, and missiles.

(U) FY 1993 Accomplishments:
(U) - Completed design prequalification of Development, Test and Evaluation (DT&E) on AXES - $110K
(U) - Began design qualification of DT&E on AXES - $50K
(U) - Completed validation of operator technical order - $30K
(U) - Continued engineering, technical assistance, and program management support for AXES - $520K

(U) FY 1994 Plans:
(U) - Complete design qualification part of DT&E on AXES - $80K
(U) - Conduct Initial Operational Test and Evaluation (IOT&E) on AXES - $50K
(U) - Conduct Functional Configuration Audit (FCA) on AXES - $40K
(U) - Continue engineering, technical assistance, and program management support for AXES - $480K
(U) - Support a study of filmless x-ray imaging technology for application to the AXES - $150K
(U) - Support development of SE software standards - $1.866M

(U) FY 1995 Plans:
(U) - Conduct Physical Configuration Audit (PCA) on AXES - $50K
(U) - Continue engineering, technical assistance, and program management support for AXES - $254K

Program Element: 0604704F
PE Title: Common Support Equipment Development
Budget Activity: 5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: 4, Tactical Programs

Date: February 1994

(U) Work Performed By: The prime contractors are ITW/Magnaflux, Chicago, IL and TRW, Dayton, OH. The in-house developing organization is Air Force Materiel Command's Aeronautical Systems Center located at Wright-Patterson AFB, OH.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	TO Complete	TOTAL Program
Appropriation 3010, Budget Activity 1200, Program Title Aircraft Common Support Equipment:								
6,714	0	0	0	0	0	0	6,714	6,714
Quantities:								
144	0	0	0	0	0	0	144	144

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 3759, Air Force Support Equipment Management: This project develops the tools and training required to increase support equipment (SE) standardization throughout DoD and reduce proliferation of SE. The Support Equipment Acquisition Management System (SEAMS) now provides, for the System Program Directors (SPDs) and Product/Materiel Group Managers (PGMs/MGMs), on-line search of DoD stock listed SE.

(U) FY 1993 Accomplishments:
(U) - Modeled a revised SE identification/acquisition process - $761K

Program Element: 0604704F **Date:** February 1994
PE Title: Common Support Equipment Development
Budget Activity: 5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: 4, Tactical Programs

(U) FY 1994 Plans:
(U) - Develop an automated support equipment (SE) identification/acquisition process - $640K
(U) - Finalize the Support Equipment Acquisition Management System (SEAMS) and pursue transfer of the SEAMS/MIL-HDBK-300 to the Defense Logistics Service Center (DLSC) - $60K

(U) FY 1995 Plans:
(U) - Continue development of an automated SE identification/acquisition process - $693K

(U) Work Performed By: The prime contractor is Scientific Applications International Corporation (SAIC), San Antonio, TX. The in-house developing organization is Air Force Materiel Command's San Antonio Air Logistics Center located at Kelly AFB, TX.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 3852, 60,000 (60K) Pound Capacity Aircraft Transporter Loader: This project completes the development of the 60,000 pound capacity aircraft transporter/loader to fulfill the requirement of Air Mobility Command's (AMC) System Operational Requirements Document (SORD) 002-89-1. The project provides a single, unique loader to on/off load C-17, C-5, C-141, C-130, C-23, C-27, C-160, KC-10, and Civil Reserve Air Fleet (CRAF) aircraft while combining the capabilities of the 40K, wide-body elevator, and lower-lobe loaders. The 60K loader will be driven on/off of the C-17, C-5, and C-141 aircraft without shoring and will be the only loading vehicle capable of moving a type V airdrop platform carrying a full 60,000 pounds required by the US Army. The 60K loader will be significantly more reliable with a 100 hours mean time between failure (MTBF) versus the 40K loader's 18 hours MTBF. Major reductions from 30 man-hours to 3 man-hours in deployment preparation times will be made. Air Force-wide a 10% reduction in overall loading time is projected.

Program Element: 0604704F
PE Title: Common Support Equipment Development
Budget Activity: 5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: 4, Tactical Programs

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) - Completed fabrication and assembly of four prototype loaders ($3.9M)
- (U) - Completed the Physical Configuration Audit (PCA) ($ included in fab & assy)
- (U) - Completed validation of technical manuals ($900K)
- (U) - Conducted Production Readiness Reviews ($150K)
- (U) - Began combined Development, Test, and Evaluation (DT&E) and Operational, Test, and Evaluation/Operational Assessment (OT&E/OA) - $1.35M
- (U) - Began operator and maintainer training ($200K)
- (U) - Provided program management support ($900K)

(U) FY 1994 Plans:
- (U) - Complete combined DT&E and OT&E/OA (FY93 $ included above)
- (U) - Conduct and complete dedicated OA (FY93 $ included above
- (U) - Complete operator and maintainer training (FY93 $ included above)
- (U) - Incorporate DT&E and OT&E/OA design/technical manual changes ($700K)
- (U) - Modify logistics support packages to include design changes ($100K)
- (U) - Provide engineering, technical assistance, and program management support ($600K)

(U) FY 1995 Plans:
- (U) - Continue sustaining engineering, technical assistance, and program management support ($608K)

(U) Work Performed By: The prime contractors are Southwest Mobile Systems, St Louis, MO and Teledyne Brown Engineering, Huntsville, AL. The in-house developing organization is the Air Force Materiel Command's Warner Robins Air Logistics Center located at Robins AFB, GA.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: 0604704F
PE Title: Common Support Equipment Development
Budget Activity: 5, Engineering and Manufacturing Development (EMD)
Old Budget Activity: 4, Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	TO Complete	TOTAL Program
Appropriation 3080, Budget Activity 8200, Program Title Vehicular Equipment								
0	27,680	29,329	34,677	35,809	36,317	37,615	Cont	TBD
Appropriation 3080, Budget Activity 8400, Program Title Other Base Maintenance and Support Equipment								
0	0	352	845	1,282	1,673	1,874	Cont	TBD
Quantities:								
0	19	27	39	40	42	42	151	360

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604706F
PE Title: Life Support Systems
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3111 Aircraft Mishap Prevention Program (AMPP)								
3,476	3,917	0	0	0	0	0	0	15,648
3812 COMBAT EDGE								
1,024	751	80	0	0	0	0	0	20,945
412A Life Support Systems								
7,544	6,245	4,978	4,055	4,003	3,997	4,096	Cont	TBD
Total								
12,044	10,913	5,058	4,055	4,003	3,997	4,096	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element is devoted to Engineering and Manufacturing Development (EMD) of aircrew life support equipment and is therefore included in budget activity 5 (EMD). Project 3111 develops a management information system to reduce loss of aircrew lives and aircraft due to human factors. Project 3812 develops a pressure breathing for G system for F-15 and F-16 crew members to help reduce the likelihood of G-induced loss of consciousness incidents and increase pilot endurance under high-G combat conditions. Project 412A is the core project providing centralized management of life support items and subsystems such as flight clothing, flight helmets, oxygen breathing equipment for aviators, anti-G coveralls, survival radios, night vision devices, and aircraft ejection seats. These items are critically needed to assure safety and functional capability of aircrews

Program Element: #0604706F **Date: February 1994**
PE Title: Life Support Systems
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

throughout all mission environments and to enhance survival and recovery in emergency and wartime situations. It also provides for EMD of emergency equipment and protective clothing and devices for non-flying personnel.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 3111, Aircraft Mishap Prevention Program: This project develops a central system within the Air Force Safety Agency (AFSA) to analyze the human factor elements in aircraft mishaps. The results will assist the Air Force in the reduction of aircraft mishaps and the loss of human life.

(U) FY 1993 Accomplishments:
(U) - Conducted AMPP Critical Design Review. ($700K) (Nov 92)
(U) - Initiated Software Development, Coding and Testing. ($2,500K) (Nov 92)
(U) - Installed preliminary system hardware and demonstration software. ($276K) (Aug 93)
(U) - Conducted preliminary design review. (Not separately priced (NSP)) (Oct 92)

(U) FY 1994 Plans:
(U) - Conduct Test Readiness Review. ($200K) (Nov 93)
(U) - Complete Development Test and Evaluation. ($2000K) (Mar 94)
(U) - Perform System configuration and physical configuration audits. ($28K) (Apr 94)
(U) - Conduct Analyst training. ($150K) (May 94)
(U) - Support AFSA system introduction. ($1,539K) (Sep 94)

(U) FY 1995 Plans: Not Applicable.

(U) Program to Completion: Not Applicable.

(U) Work Performed By: Human Systems Center, Brooks AFB TX manages the Aircraft Mishap Prevention project. The prime contractor is ETA Technologies Corp., San Diego CA. The principal government agency supporting the AMPP program is the Air Force Safety Agency, Kirtland AFB NM.

Program Element: #0604706F **Date: February 1994**
PE Title: Life Support Systems
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

(U) Related Activities:
(U) - PE #0603231F, Crew Systems Technology.
(U) - PE #0602241F, Ejection Seat Bio-Dynamics.
(U) - Joint Potential Designator is not applicable.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U)Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 3812, COMBAT EDGE: This project develops and fields a pressure breathing for G (PPG) (to counter acceleration effects) for F-15 and F-16 crew members using the G-protection aspects developed in the Tactical Life Support System (TLSS). The system includes an upper torso counterpressure vest, the lower body anti-G suit garment, a lightweight helmet modified with a tensioning bladder, a new oxygen mask, an integrated terminal block, and a modification to the existing oxygen regulator and anti-G valve.

(U) FY 1993 Accomplishments:
(U) - Initiated Follow-on Test and Evaluation (FOT&E) on system improvements. ($324K) (Sep 93)
(U) - Conducted in-house flight test program for Mask Improvement/Integration. ($150K) (Jun 93)
(U) - Supported joint program initiatives with the Navy. ($50K) (Sep 93)
(U) - Deployed COMBAT EDGE system to CONUS, USAFE, and PACAF F-16 units ($500K) (Sep 93)

(U) FY 1994 Plans:
(U) - Complete Follow-on Test and Evaluation (FOT&E) on improvements to bladder for HGU-53/P helmet. ($150K) (Jan 94).
(U) - Conduct manrating on mask improvements (field of view and valsalva). ($100K)
(U) - Continue deployment of COMBAT EDGE to ANG, AFRES, and remaining active units. ($501K) (Jul 94)

Program Element: #0604706F **Date: February 1994**
PE Title: Life Support Systems
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

(U) FY 1995 Plans:
(U) - Conduct Follow-on Test and Evaluation (FOT&E) on mask improvements (comfort and hang). ($80K) (Feb 95)
(U) - Support deployment of COMBAT EDGE system to F-15 units. (Not separately priced (NSP)) (Sep 95)

(U) Program to Completion: Not Applicable.

(U) Work Performed By: Human Systems Center, Brooks AFB TX manages the COMBAT EDGE project (#3812). Boeing Aircraft Company, Seattle WA was the prime contractor. Gentex Corp. (East), Carbondale PA (for the oxygen mask) and ARO Corp., Buffalo NY (for vest, helmet modification kit, and integrated terminal block) are the main component contractors. Systems Research Laboratory, Dayton OH is prime on manside improvements.

(U) Related Activities:
(U) - PE #0602201F, Aerospace Flight Dynamics.
(U) - PE #0602202F, Aerospace Biotechnology.
(U) - PE #0603211F, Aerospace Structures/Materials.
(U) - PE #0603231F, Crew Systems Technology.
(U) - PE #0602241F, Ejection Seat Bio-Dynamics.
(U) - PE #0602758N, Biomedical Technology.
(U) - Joint Potential Designator is not applicable.
(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U)Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements:
(U) - COMBAT EDGE will be releasable to F-16 European Participating Group (EPG) and Foreign Military Sales (FMS) countries. Lockheed (Forth Worth) is currently working with EPG/FMS countries to determine requirements for both production and retrofit of existing aircraft.

Program Element: #0604706F
PE Title: Life Support Systems
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

3. (U) Project 412A, Life Support Systems: Provides for EMD of life support equipment and subsystems to satisfy operational command requirements for improved life support equipment to maximize aircrew capability throughout all environments and to enhance survivability in emergency situations.

(U) FY 1993 Accomplishments:
(U) - Awarded Engineering and Manufacturing Development (EMD) contracts for Night Vision System (NVS). ($5,057K) (Jun 93)
(U) - Supported development of Advanced Technology Anti-G Suit (ATAGS). ($1,442K) (Apr 93)
(U) - Provided technical support to F-22 EMD program for life support equipment design and testing. ($10K) (Sep 93)
(U) - Provided technical support for Thermal Flashblindness Protection Device program. ($70K) (Sep 93)
(U) - Initiated Qualification Test and Evaluation (QT&E) of Universal Water Activated Release System (UWARS). ($500K funded by PE 64609F) (Jun 93)
(U) - Completed definition of AFSOC requirements for Active Noise Reduction (ANR). ($700K) (Aug 93)
(U) - Completed development of Advanced Recovery Sequencer (ACES II seat). ($165K) (Aug 93)
(U) - Technical support for advanced development of life support programs in the laboratories ($100K) (Sep 93)

(U) FY 1994 Plans:
(U) - Complete Night Vision System (NVS) preliminary design phase. ($2,450K) (Dec 93)
(U) - Complete NVS prototype development. ($1,250K) (May 94)
(U) - Complete NVS critical design phase. ($2,445K) (Jul 94)
(U) - Complete government assessment of prototype NVS systems. ($100K) (Sep 94)
(U) - Provide technical support to F-22 EMD program for life support equipment design and testing. (Not Separately Priced (NSP)) (Sep 93)
(U) - Complete QT&E of Universal Water Activated Release System (UWARS). (funded by PE 64609F) (Nov 93)
(U) - Support UWARS Operational Test and Evaluation. (funded by PE 64609F) (Mar 94)
(U) - Conduct Active Noise Reduction testing in AFSOC aircraft. (funded by USSOCOM) (Sep 94)

(U) FY 1995 Plans:
(U) - Receive Night Vision System (NVS) DT&E units. ($4,478K) (Apr 95)

Program Element: #0604706F
PE Title: Life Support Systems
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

(U) - Complete Night Vision System (NVS) DT&E. ($500K) (Sep 95)
(U) - Provide technical support for UWARS production contract. (NSP) (Sep 95)

(U) Program to Completion:
(U) - Provide continued technical support for UWARS program. (FY 96)
(U) - Complete Night Vision System (NVS) program. (FY98)

(U) Work Performed By: Air Force Material Command's Human Systems Center (HSC), Brooks AFB TX, manages the Life Support Systems, Project 412A. Support is also provided by other Service organizations. The top five major contractors involved in this project are: ALAR Productions, Inc., Kent OH; Boeing Aircraft Company, Seattle WA; Gentex Corp. Carbondale PA (East) and Pomona CA (West); Conax Florida Corp., St Petersburg FL; and Bose Corp., Framingham MA. Government agencies supporting Life Support projects include the following: Air Force Flight Test Center, Edwards AFB CA; Wright Labs, Wright-Patterson AFB OH; Armstrong Laboratories, Brooks AFB TX; Naval Air Development Center, Warminister PA; Air Force Safety Agency, Kirtland AFB NM; and the Technology Transfer Office, Wright-Patterson AFB OH.

(U) Related Activities:
(U) - PE #0602201F, Aerospace Flight Dynamics.
(U) - PE #0602202F, Aerospace Biotechnology.
(U) - PE #0603211F, Aerospace Structures/Materials.
(U) - PE #0603231F, Crew Systems Technology.
(U) - PE #0602723A, Clothing, Equipment and Shelter Technology.
(U) - PE #0604204A, Air Mobility Support Equipment.
(U) - PE #0604609F, Technology Transfer Office.
(U) - PE #0602241F, Ejection Seat Bio-Dynamics.
(U) - PE #0602758N, Biomedical Technology.
(U) - PE #0603216N, Mission Oriented Clothing and Devices.
(U) - PE #0604264N, Aviation Personnel Life Support System.
(U) - PE #0603216N, Aircrew System Technology.

Program Element: #0604706F **Date:** February 1994
PE Title: Life Support Systems
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

(U) - There are multiple efforts within this project. Joint Potential Designator is not applicable to most projects with the exception of the Night Vision System project. The Navy and the Marines have expressed an interest in participating in a joint NVS program.

(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604708F
PE Title: Civil, Fire, Environmental, Shelter Engineering
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2054 Aerospace Facilities Engineering Development								
377	739	665	666	743	772	801	Cont	Cont
2505 Aircraft Fire Fighting, Suppression and Rescue								
910	1,365	1,293	1,295	1,271	1,320	1,373	Cont	Cont
2674 Tactical Shelters								
754	1,577	591	324	273	303	283	Cont	Cont
3788 Environmental Quality								
472	752	665	665	743	772	802	Cont	Cont
Total								
2,513	4,433	3,214	2,950	3,030	3,167	3,259	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program funds the development, testing and evaluation of materials, equipment and procedures in four separate areas: a) Facilities Engineering improves the operational effectiveness, survivability, durability, and longevity of air base pavements, buildings and utilities; the overall objective is to provide an infrastructure that effectively supports the USAF mission, contributes to high sortie rates, is less susceptible to damage from enemy actions or natural disasters, and is more rapidly returned to service if damaged. b) Fire Fighting Suppression and Rescue develops new concepts and technology applications to increase fire fighting support of combat operations, to improve base recovery after attack capabilities, and to reduce fire risks to personnel and resources. c) Tactical Shelters is the USAF

Program Element: 0604708F **Date:** February 1994
PE Title: Civil, Fire, Environmental, Shelter Engineering
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 4 - Tactical Programs

portion of a tri-service effort to develop standardized, low maintenance, survivable shelters and shelter accessories that are easily mobilized and compatible with air, sea and land transport systems. These products will effectively support high-mobility aircraft support, command and control, communications, medical, and data processing units for the tactical and strategic forces. d) Environmental Quality reduces long-term disposal/cleanup costs and helps ensure USAF compliance with Environmental Protection Agency (EPA) regulations through development of means to identify hazardous waste and pollutant sources, reduce output of sources, mitigate the effects of wastes and pollutants, and dispose of wastes when contamination occurs. This project also develops environmentally less hazardous materials, processes, and technologies to support the Chief of Staff and Secretary of the Air Force's Pollution Prevention Action Plan. Work performed under this program element is in the category of Engineering and Manufacturing Development (EMD). The work accomplished qualifies as EMD because it involves adapting mature theories and technologies to military use.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2054, Aerospace Facilities Engineering Development: Develops equipment, materials, and procedures to improve the operational effectiveness of aerospace facilities.

(U) FY 1993 Accomplishments:
- (U) - Continued development of new family of environmental control units, $375K.
- (U) - Completed development of commercial solar energy systems for military application, $2K.

(U) FY 1994 Planned Program:
- (U) - Continue development of new family of environmental control units, $687K.
- (U) - Begin commercial technology exploitation for upgraded airfield arresting system, $52K.

(U) FY 1995 Planned Program:
- (U) - Complete development of new family of environmental control units, $515K.
- (U) - Continue commercial technology exploitation. Complete upgraded airfield arresting system, $50K.
- (U) - Begin development of advanced mobile power systems, $100K.

Program Element: 0604708F
PE Title: Civil, Fire, Environmental, Shelter Engineering
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) Work Performed By: A.D. Little, Boston MA; Aeronautical Systems Center, Range and Air Base Systems Program Office, Eglin AFB FL.

(U) Related Activities:
(U) - PE 0603723F, Civil and Environmental Engineering Technology.
(U) - PE 0602206F, Civil Engineering and Environmental Quality.
(U) - Close cooperation is maintained with other services via the Joint Services Civil Engineering Research and Development Coordinating Group and Project Reliance.
(U) - There is no unnecessary duplication of effort within the AF or DOD.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 2505, Fire Fighting, Suppression, and Rescue: Develops improved fire fighting, suppression and rescue equipment, materials, and methods to increase fire protection readiness, mobility, and effectiveness.

(U) FY 1993 Accomplishments:
(U) - Completed draft Request for Proposal (RFP) for development of the deployable fire protection system (DFPS), $110K.
(U) - Continued development of the chemical warfare kit for the new self-contained breathing apparatus (SCBA), 225K.
(U) - Completed commercial technology exploitation for the P-19 high reach agent dispersing system, rapid intervention vehicle dual agent turret, fire drill II, and eye witness command control video system, $250K.
(U) - Continued fire fighter multimedia training system (FMTS) courseware development for F-15, C-141, C-5, and B-1. Began F-16 and post attack courseware development, $325K.

(U) FY 1994 Planned Program:
(U) - Prepare for award of EMD contract for development of DFPS, $250K.

Program Element: 0604708F **Date:** February 1994
PE Title: Civil, Fire, Environmental, Shelter Engineering
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 4 - Tactical Programs

(U) - Complete development of SCBA, $72K.
(U) - Continue courseware development of FMTS. Completes F-15, F-16, C-141, C-5, B-1 aircraft and post attack. Begin courseware development of firefighter physical fitness program, SCBA training, and procedures on Civil Reserve Air Fleet (CRAF) aircraft, $484K.
(U) - Complete commercial technology exploitation for the nightscan telescoping fireground lighting system, hydrochem nozzle, AFFF/dry chemical, compressed air foam system, and positive pressure ventilation on large frame aircraft, $460K.
(U) - Begin development of fire fighter cooling, $44K.
(U) - Begin development of enhanced flame detector, $28K.
(U) - Begin development of enhanced turret operations, $27K.

(U) FY 1995 Planned Program:
(U) - Award EMD contract for DFPS and begin support of production contract, $573K.
(U) - Continue courseware development for FMTS. Accomplish courseware development of FMTS for structural, C-747, C-17 aircraft and HAZMAT I and II, $250K.
(U) - Continue commercial technology exploitation, $350K
(U) - Continue development of fire fighter cooling system, $50K.
(U) - Continue development of enhanced flame detector, $40K.
(U) - Continue development of enhanced turret operations, $30K.

(U) Work Performed By: Interspiro, Inc., Branfort CT; Det 8, Combat Camera Squadron, Hill AFB UT; Aeronautical Systems Center, Range and Air Base Systems Program Office, Eglin AFB FL.

(U) Related Activities:
(U) - PE 0603723F, Civil and Environmental Engineering Technology.
(U) - PE 0602206F, Civil Engineering and Environmental Quality.
(U) - PE 0604617F, Contingency Operations.
(U) - PE 00604016, Nuclear, Biological, and Chemical Warfare Defense.
(U) - There is no unnecessary duplication of effort within the AF or DOD.

Program Element: 0604708F
PE Title: Civil, Fire, Environmental, Shelter Engineering
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 2674, Tactical Shelters: Provides reliable, cost effective tactical shelters required to ensure the success of Air Force missions, provides Air Force membership in the DOD Tactical Shelter Program, and provides technology insertion for shelter development.

(U) FY 1993 Accomplishments:
- (U) - Began product improvement study for electromagnetic interference (EMI) on shelters, $20K.
- (U) - Began non-destructive testing on shelter panels for the environmental effects and improvement to adhesives program, $40K.
- (U) - Began development of chemical and biological protection for shelters that use environmental control units, $65K.
- (U) - Began a stylus electroplating control and materials selection protocol program for field application of EMI coatings, $65K.
- (U) - Completed a nickel-tin coating for interface bars program to ensure EMI connectivity for complexible shelters, $2.5K.
- (U) - Attended meetings of the Joint Committee for Tactical Shelters (JOCOTAS) and American Society for Testing and Materials (ASTM). Coordinated with other Air Force agencies on shelter requirements. Funded ESC personnel, contractor support, MITRE support, travel, equipment, supplies, and overhead, $561.5K.

(U) FY 1994 Planned Program:
- (U) - Continue product improvement study for EMI on shelters, $30K.
- (U) - Continue the chemical and biological development program for shelters that use environmental control units, $50K.
- (U) - Continue the stylus electroplating control and materials selection protocol program for field application of EMI coatings, $50K.
- (U) - Begin EMD phase of R-134a environmental control unit upgrade to non-ozone depleting chemicals, $350K.

Program Element: 0604708F **Date:** February 1994
PE Title: Civil, Fire, Environmental, Shelter Engineering
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 4 - Tactical Programs

(U) - Develop and acquire new or modified shelter systems in conjunction with ASC/YO to support the bare base development program, $100K.
(U) - Continue Shelters 2000 program to develop new technologies for tactical shelters by the year 2000, $265K.
(U) - Attend meetings of the Joint Committee for Tactical Shelters (JOCOTAS) and American Society for Testing and Materials (ASTM). Coordinate with other Air Force agencies on shelter requirements. Fund ESC personnel, contractor support, MITRE support, travel, equipment, supplies, and overhead, $732K.

(U) FY 1995 Planned Program:
(U) - Attend meetings of the Joint Committee for Tactical Shelters (JOCOTAS) and American Society for Testing and Materials (ASTM). Coordinate with other Air Force agencies on shelter requirements. Fund ESC personnel, contractor support, MITRE support, travel, equipment, supplies, and overhead, $591K.

(U) Work Performed By: Work is performed by the in-house developing organization, Electronic Security Command, Hanscom AFB MA. Work is performed by the following contractors: RJO Enterprise, Bedford MA; Horizon Technology, Billerica MA; Mitre Corp, Bedford MA.

(U) Related Activities:
(U) - Close cooperation is maintained with other services via the Joint Committee on Tactical Shelters.
(U) - There is no unnecessary duplication of effort within the AF or DoD.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Germany: #DEA-A-64-G-1037, Accessories and Organizational Equipment, 1964; Israel: #DEA-A-86-IS-1313, Mobile Shelters and Organizational Equipment, 1986; France: #DEA-A-87-F-1356, Mobile Shelters, 1987.

4. (U) Project 3788, Environmental Quality: Develops means to identify hazardous waste and pollutant sources, reduce output of sources, mitigate the effects of wastes and pollutants, provide cost-effective disposal of waste, and conduct site remediation.

Program Element: 0604708F
PE Title: Civil, Fire, Environmental, Shelter Engineering
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) - Completed predictive mesoscale model of rocket launches and the collection and integration of aircraft dat and VOC data for the EDMS, $55K.
- (U) - Continued assimilation and integration of JP-4/JP-8 contamination data as a tool for categorizing fuel spills and conducting cleanup plans and impact assessments, $417K.

(U) FY 1994 Planned Program:
- (U) - Highly Energetic Materials, $190K.
- (U) - Define scope of program.
- (U) - Investigate potential international application of technology.
- (U) - Participate in lab program to build a pilot scale bioreactor.
- (U) - Site Remediation, $227K.
- (U) - Define scope of program.
- (U) - Perform technical evaluation on completion of current field study.
- (U) - Perform cost benefit analysis of alternative approaches.
- (U) - Study integration of options to provide a comprehensive remediation approach.
- (U) - Site Characterization, $335K.
- (U) - Define scope of program.
- (U) - Participate in field demonstration of site characterization technologies.
- (U) - Participate in EPA demonstration of site characterization technologies.

(U) FY 1995 Planned Program:
- (U) - Highly Energetic Materials, $170K.
- (U) - Review and comment on documentation to be provided at completion of lab effort.
- (U) - Participate in lab program operating a pilot scale bioreactor.
- (U) - Review results of pilot scale program.
- (U) - Site Remediation, $230K
- (U) - Perform risk reduction study of available technologies.
- (U) - Study integration options to provide a comprehensive remediation approach.

Program Element: 0604708F
PE Title: Civil, Fire, Environmental, Shelter Engineering
Budget Activity: 5 - Engineering and Manufacturing Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

(U) - Ensure proposed test approach is coordinated and approved by EPA.
(U) - Site Characterization, $265K.
(U) - Provide Air Force requirements to tri-service lead.
(U) - Investigate system enhancements/modifications for expanded application.
(U) - Evaluate tri-service operational employment of Air Force concept of operations.

(U) Work Performed By: Work is performed by Environmental Systems Division, HSC/YAQ.

(U) Related Activities:
(U) - PE 0603723F, Civil and Environmental Engineering Technology.
(U) - PE 0602206F, Civil Engineering and Environmental Quality.
(U) - Close cooperation is maintained with other services via the Joint Services Civil Engineering Research and Development Coordinating Group and Project Reliance.
(U) - There is no unnecessary duplication of effort within the AF or DOD.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604711F
Date: February 1994
PE Title: System Survivability
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #3 - Strategic Programs

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2485 Survivability/Vulnerability (S/V) Assessment of Ground C3 Systems								
756	953	811	979	1,352	1,411	1,475	Cont	Cont
3763 S/V Assessment of Aerospace Systems								
5,282	2,670	1,975	2,058	2,086	2,110	2,235	Cont	Cont
Total								
6,038	3,623	2,786	3,037	3,438	3,521	3,710	Cont	Cont

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element develops and demonstrates the capabilities necessary for Air Force and DoD systems to survive the hazardous effects of advanced technology and nuclear weapons. Environments include high power microwaves, directed energy weapons, electromagnetic effects, and nuclear electromagnetic pulse. The efforts pursued under this RDT&E program fall under research category 6.5, engineering and manufacturing development. The program is designed to ensure that engineering and manufacturing development satisfies systems' requirements to sustain and operate in hostile weapon environments. Hardening techniques, assessment and verification methods, specifications and standards, and hardness maintenance and surveillance techniques are refined and transitioned to the product divisions, depots, operating commands, and test and evaluation organizations for use on military and civilian systems, including commercial aircraft.

Program Element: #0604711F
PE Title: System Survivability
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #3 - Strategic Programs

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 2485, Survivability/Vulnerability (S/V) Assessment of Ground C3 Systems: Refines and validates S/V assessment methodology for ground C3I systems. Determines advanced technology weapon and nuclear S/V of selected systems by analysis and testing. Supports development of advanced hardening and Hardness Maintenance/Surveillance techniques. Transfers engineering techniques to product divisions and user commands for application to systems.

(U) FY 1993 Accomplishments:
- (U) - Completed continuous wave High Power Radio Frequency (HPRF) measurements on Hawk missile. ($356)
- (U) - Demonstrated high frequency direct drive on mobile ground system. ($300)
- (U) - Began weapon effects engagement simulation with EADSIM code. ($50)
- (U) - Began planning for a foreign C3I system experiment. ($50)

(U) FY 1994 Plans:
- (U) - HPRF direct drive experiments on Hawk missile system. ($353)
- (U) - Threat level HPRF tests on Hawk. ($250)
- (U) - Weapon effects engagement simulations with EADSIM code. ($150)
- (U) - Assess the vulnerability of a foreign C3I system. ($200)

(U) FY 1995 Plans:
- (U) - Evaluate weapons applications for suppression of enemy air defense mission. ($311)
- (U) - Assess selected C3I and air defense systems. ($300)
- (U) - Investigate use of reverb chamber for system assessments. ($200)

(U) Work Performed By: Kaman Sciences Corp., United International Engineering Inc., Albuquerque, NM. In house organization: Phillips Laboratory, Kirtland AFB, NM.

Program Element: #0604711F **Date: February 1994**
PE Title: System Survivability
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #3 - Strategic Programs

(U) Related Activities:
- (U) - Program Element #0602601F, Advanced Weapons.
- (U) - Program Element #0603605F, Advanced Weapons Technology.
- (U) - There is no unnecessary duplication of effort within the Air Force or DoD. USD(A&T) has established a joint DoD/Service program to coordinate agency electromagnetic pulse technology efforts.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project 3763 Survivability/Vulnerability (S/V) Assessment of Aerospace Systems: Refines and validates S/V assessment methodology for aerospace systems. Determines advanced technology weapon (ATW) and nuclear S/V of selected systems by analysis and testing. Supports development of advanced hardening and hardness maintenance/hardness surveillance (HM/HS) techniques. Transfers engineering techniques to product divisions, operating commands, and commercial users for application to systems. Develops ATW and nuclear weapon effect survivability parameters (thresholds and objectives) for systems requiring survivability; users and system program offices incorporate parameters into requirement documents, program baselines, and cost and operational effectiveness analyses. Develops specifications and standards for protection of aerospace systems against electromagnetic (EM), ATW, and nuclear effects.

(U) FY 1993 Accomplishments:
- (U) - Improved measurement techniques for cable shields. ($200)
- (U) - Completed Ellipticus continuous wave (CW) antenna. Operates up to 3 GHz. ($1000)
- (U) - Compared CW results with High Power Radio Frequency (HPRF) pulser data. ($100)
- (U) - Completed military handbook for electromagnetic pulse (EMP) Verification Methods. ($50)
- (U) - Supported HM/HS program for B-1 and B-2. ($50)
- (U) - Developed high frequency (1 GHz) direct drive system. ($200)
- (U) - Demonstrated high frequency system level measurement capability on the EMP test aircraft. ($1682)
- (U) - Participated in revision of DoD Standard 2169 for high altitude electromagnetic pulse (HEMP) environment. ($40)

Program Element: #0604711F **Date:** February 1994
PE Title: System Survivability
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #3 - Strategic Programs

(U) - Contributed sections to new FAA/European standard for high intensity radiated field (HIRF) environments. Dual use applications. ($100)
(U) - Demonstrated the use of white noise for measuring aircraft shielding. ($100)
(U) - Improved computer codes for high power microwave coupling to aircraft. ($50)
(U) - Completed initial plasma shield experiment. ($200)
(U) - Developed and validated initial space debris fracture models. ($250)
(U) - Designed guideline on digital communication in fading environments. ($300)
(U) - Studied propagation path disruption in nuclear environments. ($100)
(U) - Evaluated materials aged in long duration space environment. ($100)
(U) - Designed critical ionization experiment and acquired hardware. ($300)
(U) - Added major improvements to satellite environment codes. ($250)
(U) - Revised system survivability criteria handbook to add advance technology weapons (ATW) parameters. ($200)
(U) - Developed nuclear survivability criteria for Follow-on Early Warning System. ($10)

(U) FY 1994 Plans:
(U) - Support Hardness Maintenance/Surveillance (HM/HS) program development for B-1 and B-2. ($70)
(U) - Support joint US/French coupling experiment on electromagnetic pulse test aircraft. ($150)
(U) - Demonstrate high power microwave (HPM) hardening on F-16 testbed aircraft. ($400)
(U) - Support to NASA HIRF coupling experiment on 737 aircraft. ($250)
(U) - Increase bandwidth of continuous wave (CW) facilities to 4 GHz. ($150)
(U) - Conduct HPM/Ultrawide Band (UWB) effects experiments on systems. ($300)
(U) - Complete portable elliptic antenna for remote tests. ($150)
(U) - Begin development of Built-In-Test (BIT) using white noise. ($100)
(U) - Complete the hardening design for the LANTIRN. ($200)
(U) - Increase capabilities of computer models for HPM. ($50)
(U) - Disturbed environments and jamming mitigation studies and design guidelines. ($250)
(U) - Improve space debris interaction models. ($150)
(U) - Critical ionization velocity experiment on Space Test Program satellite. ($150)
(U) - Conduct nuclear criteria studies for nuclear detection system and single reentry vehicle ICBM. ($150)

Program Element: #0604711F **Date:** February 1994
PE Title: System Survivability
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #3 - Strategic Programs

(U) - Design for plasma shield experiment. ($150)

(U) FY 1995 Plans:
- (U) - Finalize LANTIRN high power microwave (HPM) hardening design. ($325)
- (U) - Conduct HPM/ultra-wide band (UWB) experiments on selected systems. ($250)
- (U) - Develop HPM hardening designs for advanced aircraft. ($200)
- (U) - Support hardness maintenance/hardware surveillance (HM/HS) programs at Oklahoma City ALC. ($100)
- (U) - Support new FAA/European standards for high intensity radiated field environments. ($50)
- (U) - Demonstrate Built-in Test of electromagnetic (EM) shielded systems. ($200)
- (U) - Improve computer codes for UWB coupling. ($100)
- (U) - Begin military handbook on HPM design guidelines for aircraft. ($100)
- (U) - Complete critical ionization velocity experiments. ($150)
- (U) - Design guidelines for satellite communications in nuclear environments. ($150)
- (U) - Put radio frequency effects module in space environments codes. ($100)
- (U) - Compare space debris models with experiment. ($100)
- (U) - Construct plasma shield model for space experiments. ($150)

(U) Work Performed By: Kaman Sciences Corp., United International Engineering Inc., Albuquerque, NM. In house organizations: Phillips Laboratory and the Office of Aerospace Studies, Kirtland AFB, NM.

(U) Related Activities:
- (U) - Program Element #0602601F, Advanced Weapons.
- (U) - Program Element #06036438F, Satellite Systems Survivability.
- (U) - Program Element #0603605F, Advanced Weapons Technology.

Program Element: #0604711F **Date:** February 1994
PE Title: System Survivability
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #3 - Strategic Programs

(U) - There is no unnecessary duplication of effort within the Air Force or DoD. The USD(A&T) has established a joint DoD/Service program to coordinate agency electromagnetic pulse (EMP) technology efforts. The Defense EMP Standards and Specifications Program gives the Air Force the responsibility for aircraft standards within DoD.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

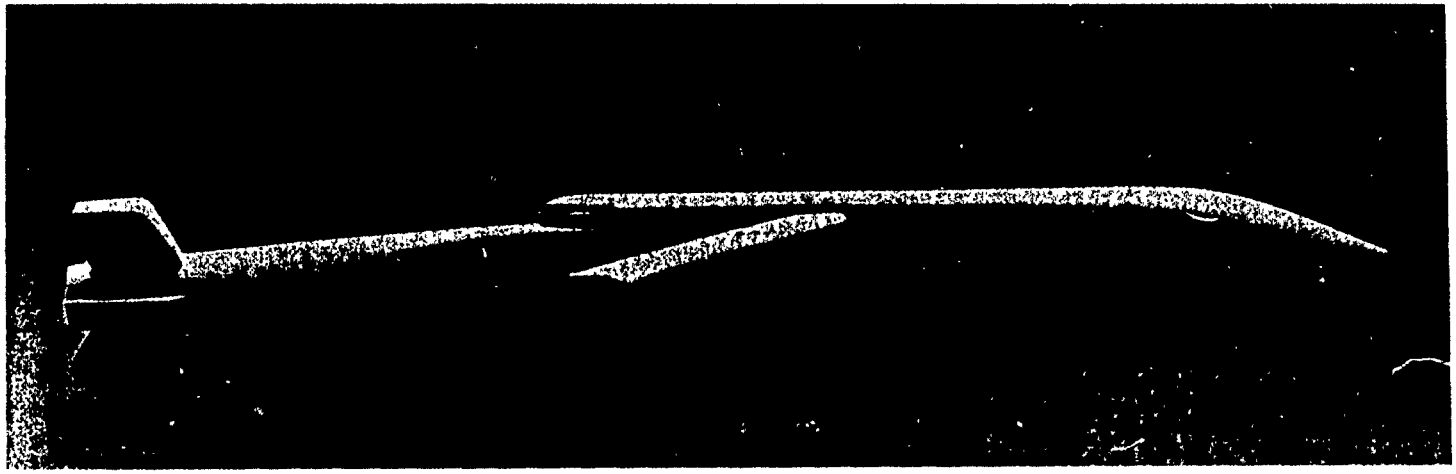
(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: # 0604727F
PE Title: Joint Standoff Weapons

Project Number: # 1000 Date: February 1994
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: # 4 - Tactical Programs

Project Title: Joint Standoff Weapons



Program Element: # 0604727F
PE Title: Joint Standoff Weapons

Project Number: # 1000 Date: February 1994
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

POPULAR NAME: JSOW

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones		MS II Aug 94					MS III 4th Qtr	
Engineering Milestones		SDR Jun 94	PDR Jul 95	CDR Jul 96				
T&E Milestones			DT&E Jun 95		IOT&E 3rd Qtr 97			
Contract Milestones	Pre-EMD May 93		EMD Oct 94					
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	3,755	16,353	35,289	32,170	4,543,	4,337	4,630	111,569 / (10,492)
Support Contract	1,316	2,500	2,678	2,760	2,043	2,248	2,297	18,963/ (3,121)
In-House Contract	302	700	913	960	481	1,000	1, 020	7,064/ (1,688)
GFE/Other	90	4,814	10,086	8,361	2,595	2,437	2,481	36,178 / (5,314)
Total	5,463	24,367	48,966	44,251	9,662	10,022	10,428	173,774 / (20.615)

Program Element: # 0604727F
PE Title: Joint Standoff Weapons

Project Number: # 1000
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This program provides for integration of the Air Force's BLU-108/B (Sensor Fuzed Weapon submunition) into the Joint Standoff Weapon (JSOW), formerly known as the Advanced Interdiction Weapon System, and development testing with the F-16. Future integration with the F-15E and B-1 is also planned. The Air Force requires a capability to destroy multiple enemy tanks and other armored vehicles during a single aircraft pass with a standoff capability. This need is documented in Mission Need Statement for an Improved Wide Area Capability. This program is in the Engineering and Manufacturing Development budget activity because the Air Force is funding development of the dispense system and integration of the developmental JSOW Baseline vehicle and the existing BLU-108 submunition and testing the JSOW vehicle for Air Force use.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Define operational concept, mission planning, aircraft environment, and dispensing system ($1,100K)
   - (U) - Start Cost and Operational Effectiveness Analysis (COEA) ($500K)
   - (U) - Conduct trade studies ($300K)
   - (U) - Start simulations and wind tunnel testing ($100K)
   - (U) - Develop/procure environmental test vehicle ($3,500K)

2. (U) FY 1994 Planned Program:
   - (U) - Define aircraft/weapons environment ($2,800K)
   - (U) - Conduct simulations and continue wind tunnel testing ($700K)
   - (U) - Conduct System Design Review ($2,400K)
   - (U) - Conduct test planning and conduct flight certification for F-16 ($3,100K)
   - (U) - Design dispensing system, mission planning, and operational flight program ($8,600K)
   - (U) - Demonstrate dispenser design and weapon pattern ($5,800K)
   - (U) - Complete COEA ($1,000K)

3. (U) FY 1995 Planned Program:
   - (U) - Plan, design and produce test vehicles ($14,400K)
   - (U) - Plan,design and conduct 18 flight tests ($7,900K)

Program Element: # 0604727F
PE Title: Joint Standoff Weapons

Project Number: # 1000
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Integrate BLU-108 into JSOW, conduct PDR, and prepare documentation ($18,900K)
(U) - Start development of the Operational Flight Program (OFP) tape for F-16 ($7,800K)

4. (U) Program to Completion:
(U) - Plan, design and produce test vehicles including DT&E, IOT&E, and SEEK EAGLE test assets ($31,100K)
(U) - Plan, design, conduct and complete flight tests ($30,800K)
(U) - Mission planning, OFP tape, and aircraft modification ($2,500K)
(U) - Integrate BLU-108 into JSOW, conducts reviews and prepare documentation ($30,100K)

D. (U) WORK PERFORMED BY: The prime contractor on this program will be the Navy JSOW prime contractor, Texas Instruments of Lewisville, Texas. A supporting contractor will be the F-16 prime contractor, Lockheed (formerly General Dynamics) of Fort Worth, Texas. Program management is provided by NAVAIR, Conventional Strike Weapons System Program Office, Arlington, Virginia, and the Aeronautical Systems Center, Air-to-Surface Weapons Program Office, Eglin AFB, Florida.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: NONE

2. (U) SCHEDULE CHANGES: EMD start moved from Aug 94 to Oct 94 because of insufficient time after the DAB review (Aug 94) to award the contract in FY94. Milestone III moved from 4th Qtr FY98 to 4th Quarter FY99 to accomodate two years of low rate production before starting full rate production. Other changes are minor adjustments to the testing schedule--DT&E now starts one quarter earlier, and IOT&E now starts three quarters later because DT&E will test more weapons.

3. (U) COST CHANGES: Minor adjustment in FY94 budget for program assessments. Total program costs remain the same.

F. PROGRAM DOCUMENTATION:
- (U) USAF MENS 2-79, Improved Wide Area Antiarmor Capability (U), September 14, 1979 (S)
- (U) Joint Operational Requirement Document (Draft)

Program Element: # 0604727F
PE Title: Joint Standoff Weapons

Project Number: # 1000
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

- (U) Joint Standoff Weapon (JSOW) Acquisition Decision Memorandum (ADM), June 23, 1992

G. RELATED ACTIVITIES:
- (U) Program Element 0604727N, (Joint Standoff Weapon)
- (U) Program Element 0604607F, (Wide Area Antiarmor Munition)
- (U) JSOW will be integrated with the following programs: Program Element (PE) 0604226F (B-1), PE 027133F (F-16), PE 027134F (F-15)
- (U) PE 0604618F, Joint Direct Attack Munitions (JDAM) (Guidance Commonality)
- (U) Joint Potential Designator: Joint
- (U) The JSOW program is a joint Navy and Air Force program wiht the Navy as executive service. Management relationships and responsibilities are contained in the Air Force/Navy Memorandum of Agreement of June 1992. There is no unnecessary duplication of effort within the Air Force or the Department of Defense

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3020, Budget Activity #2 - Other Missiles, Program Title Joint Standoff Weapon (JSOW)								
0	0	0	0	0	25,759	63,044	1,573,179	1,661,982
Quantities					34	126	4840	5000

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

J. (U) TEST AND EVALUATION DATA:

Program Element: # 0604727F
PE Title: Joint Standoff Weapons

Project Number: # 1000
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

T&E ACTIVITY (PAST 36 MONTHS) - NONE

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
Environmental Development Test Vehicle Delivery	Feb 94	Test F-16 & F-15E integration
F-16 Captive Flight Test	Apr 94	Define F-16 environment
F-15E Captive Flight Test	May 94	Define F-15 environment
DT&E Start	3th Qtr FY95	
IOT&E Flight Test Start	3rd Qtr FY97	

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604733F
Date: February 1994
PE Title: Surface Defense Suppression
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3006, AGM-130								
8,472	1,898	951	0	0	0	0	0	187,747
Total								
8,472	1,898	951	0	0	0	0	0	187,747

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Air Force requires standoff, precision-guided, air-to-surface conventional munitions. These munitions give the Air Force the capability to successfully roll back enemy air defenses and to attack critical high value targets in heavily defended areas. TAF SON 301-86, Short-Range Precision Standoff Surface Attack Weapon, 2 Nov 87, and TAF Sord 301-86-I/II/III-A, AGM-130 (GBU-15 P3I) Short Range Precision Standoff Surface Attack Weapon, 6 Nov 91, both call out the need for the AGM-130. The AGM-130 missile is a pre-planned product improvement to the GBU-15 guided glide bomb. The AGM-130 has a 2000-lb MK 84 blast-fragmentation or BLU-109/B penetrating warhead, TV or imaging infrared (IIR) seeker for day and night missions, plus a rocket motor for extended range. The extended range of the AGM-130 reduces delivery aircraft attrition by allowing launch from standoff range, outside target point defenses. The AGM-130, equipped with Improved Data Link (IDL) will also have the capability to attack targets in an electronic countermeasures environment. F-111F and F-15E aircraft will employ the AGM-130. The remaining funds in this program element will complete the weapon software module for the AF Mission Support System to automate and streamline air crew planning for GBU-15/AGM-130 missions. This program element is included in Budget Activity #5 because it funds all engineering and manufacturing development efforts for the AGM-130 program.

Program Element: # 0604733F
PE Title: Surface Defense Suppression
Budget Activity : # 5 -Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) Project 3006, GBU-15 P3I: Integrates an infrared seeker on the AGM-130, integrates the AGM-130 with the F-15E, and develops the IDL and the Advanced Support Equipment (ASE) for AGM-130 and GBU-15. FY 1995 effort is primarily mission planning module development and integration for both AGM-130 and GBU-15 with the Air Force Mission Support System (AFMSS).

(U) FY 1993 Accomplishments:
(U) - Completed DT&E and began IOT&E for the IDL. ($3,157)
(U) - Completed DT&E and began IOT&E on ASE; awarded ASE TPS development contract. ($2,840)
(U) - Continued Mission Support System (MSS) planning efforts for MSS II. (ECD: FY 94)($2,475)

(U) FY 1994 Plans:
(U) - Complete MSS II integration (Not separately priced.)
(U) - Award contract and begin development of weapon planning module for AFMSS. (ECD: FY 96)($1,898)
(U) - Complete F-15E integration with trade studies for envelope expansion. (Not separately priced.)

(U) FY 1995 Plans:
(U) - Continue weapon planning module integration on AFMSS. (ECD: FY 96) ($951)

(U) Work Performed By: The AGM-130 Program Director at the Air-to-Surface Weapons Systems Program Office, Aeronautical Systems Center (ASC), Eglin AFB FL, manages this program. Contractors are Rockwell International, Duluth GA (GBU-15 and AGM-130A prime contractor), Harris/Magnavox Systems Company, Melbourne FL (IDL). and General Dynamics Electronics, San Diego CA (for the MSS IIA Mission Support System programs). Contractor for AFMSS weapon planning module TBD.

(U) Related Activities:
(U) - Program Element #0604327F, Hardened Target Munitions (integration of the AGM-130 with the BLU-109/B warhead).

Program Element: #0604733F
Date: February 1994
PE Title: Surface Defense Suppression
Budget Activity : #5 -Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation 3010, Budget Activity 7, Program Title AGM-130 IDL Pods								
19,478	12,295	13,888	410	0	0	0	0	46,371
22	22	22	0	0	0	0	0	66
Appropriation 3020, Budget Activity 4, Program Title AGM-130 Missile Procurement								
79,929	70,381	71,756	89,013	68,136**	47,485**	55,905**	0	630,152
102	102	102	0*	0*	0*	0*	0	502

* FY 1996 - FY 1999 funds AGM-130 modules to replace older modules on current inventory weapons; not all-up-round missiles.
** Includes Seek Eagle and Wind Corrected Munitions Dispenser (WCMD) Kit funds.

Appropriation 3020, Budget Activity 4, Program Title AGM-130/GBU-15 Advanced Support Equipment (ASE)								
1,344**	6,035**	5,613	983	0	0	0	0	13,975
0	14*	6	0	0	0	0	0	14

* Five retrofits are included in FY 1994 funding.
** ASE units were purchased with 3080 funding prior to FY 1995

Program Element: #0604733F
PE Title: Surface Defense Suppression
Budget Activity : #5 -Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

Date: February 1994

Appropriation 3080, Budget Activity 6, Program Title AGM-130/GBU-15 IDL Weapon Data Terminals

4995	0	0	0	0	0	0	0	4995
30	0	0	0	0	0	0	0	30

(U) Military Construction: Not applicable.

(U) International Cooperative Agreements: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604735F
PE Title: Combat Training Ranges
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2152 Mission/Engineering Support								
2,412	0	0	0	0	0	0	N/A	N/A
2286 Tactical Air Forces Range Equipment								
5,388	15,626	18,301	22,171	15,080	13,442	14,157	Cont	TBD
3320 Strategic Air Command Range Equipment								
1,574	0	0	0	0	0	0	Cont	TBD
3321 Electronic Combat Test Resources *								
35,200	0	0	0	0	0	0	Cont	TBD
6510 Flight Test Threat System Simulators *								
4,514	0	0	0	0	0	0	Cont	TBD
Total								
49,088	15,626	18,301	22,171	15,080	13,442	14,157	Cont	TBD

* These two projects were transferred to PE 0604256F, Threat Simulator Development, in FY 94.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Combat Training Range (CTR) Program contributes to the effectiveness and survivability of US combat forces by developing range instrumentation and training systems (Air Combat Training Systems [ACTS]) to increase the effectiveness of training from individual aircrew skill training to large-scale exercises. This PE was restructured in FY 94 by transferring the test projects (3321 and 6510) to PE 0604256F. The remaining three projects (2152, 2286, and 3320) were comoined into Project 2286. FY 95 funding increases due to the Joint Air Combat Training System (JACTS) development program. JACTS development began in mid-FY 94, and FY 95 represents the peak year of development activities. The FY 96 increase is necessary to support the increased emphasis on the joint interoperability of training ranges within DoD.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 6510, Flight Test Threat System Simulators: This project funds the acquisition of threat simulators and advanced signal sources, and the upgrades of existing threat simulators to the current intelligence baseline. This project fills a continuing and expanding need to flight test and evaluate new, and newly modified, electronic combat (EC) equipment prior to production and to periodically verify fielded electronic warfare (EW) systems. This testing is conducted in an open-air environment which more

Program Element: #0604735F
PE Title: Combat Training Ranges
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

accurately simulates actual combat conditions than can be accomplished using digital models, installed system test facilities, or hardware-in-the-loop facilities The simulators funded by this project provide this unique capability as an integral part of the EC Test Process.

(U) FY 1993 Accomplishments:
- (U) Completed work on the SA-10 emitter. ($0.844M)
- (U) Continued to modify existing simulators to incorporate the latest intelligence information: s stems include the SADS V (Missile), SADS XI, SADS XI (Missile), SADS VI (Missile), and SADS IV (Radar). ($3.670M)

(U) FY 1994 Plans: Not applicable.

(U) FY 1995 Plans: Not applicable.

(U) Program Completion: Not applicable.

(U) WORK PERFORMED BY: This program is managed by the 46th Test Wing, Eglin AFB, FL. Major contractors are Georgia Institute of Technology, Atlanta, GA; Environmental Research Institute of Michigan; and Dynetics, Huntsville, AL.

(U) RELATED ACTIVITIES:
- (U) Navy and Army also engage in threat simulator development.
- (U) All USAF requirements for threat simulators, and all developments proposed for inclusion in this project, are reviewed by the CROSSBOW-S Committee reporting to the DoD Executive Committee on Threat Simulators (EXCOM).
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.
- (U) T&E investments for some new tri-Service common threat simulators are funded in PE 0604940D, Threat Instrumentation Development.

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

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

Program Element: #0604735F
PE Title: Combat Training Ranges

Project Number: 2286
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual*	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2286 Combat Training Range Equipment								
9,374	15,626	18,301	22,171	15,080	13,442	14,157	Cont	TBD

* Includes projects 2152 and 3320.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The Combat Training Range Program contributes to the effectiveness and survivability of US combat forces by developing range instrumentation and training systems (Air Combat Training Systems [ACTS]) to increase the effectiveness of training from individual aircrew skill training to large-scale exercises. Provides basic operating support, system software acquisition, training requirements collection, consolidation, review and support and systems engineering support such as studies, assessments, and analyses. Provides for the development of electronic, telecommunications, and instrumentation equipment/systems for the operational test and training ranges worldwide. These systems provide the necessary infrastructure to support real-time monitoring and control of aircrew air-to-air, air-to-ground, and electronic warfare training, including the ability to record events for post mission debrief and analysis. The primary developmental efforts is the Joint Air Combat Training System (JACTS). JACTS (GPS based) will replace the current Mission Debriefing System (MDS) increasing the number of instrumented participants, improving aircraft position tracking accuracy, expanding range coverage, multiplying weapons simulations and adding electronic warfare threat/aircrew interaction and computer-generated threat systems. Also included in JACTS is a transportable capability which palletizes the core capability of JACTS. JACTS will use the Ada programming language, and will provide a training capability compatible with advanced avionics equipment being integrated throughout the Armed Services. JACTS will be compatible with Distributed Interactive Simulation (DIS), as a minimum, at the system level. It will be capable of supporting Air Force, Navy and Marine composite force packages of up to 100 aircraft simultaneously. This project also provides the capability to evaluate effectiveness of aircrew tactics and countermeasures operating against hostile electronic combat threats. Other continuing efforts support interoperability of Air Force instrumented ranges with other services.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Continued CTR basic operating support, system software acquisition, and systems engineering support. ($2.109M)
   - (U) Continued to develop aircraft interface with range instrumentation pods and software upgrades, and begin development (through a joint, Navy-led, effort) of the Advance Message Oriented Data Security Module (AMODSM), an encryption device between aircraft and ground systems. ($5.504M)
   - (U) Continue Tactics Training Route Complex (TTRC) and Route Integration Instrumentation System (RIIS) development and range equipment integration and development of Bomber Airborne Instrumentation System (BAIS). ($1.263M)
   - (U) Continue Range Airspace Management System (RAMS). ($.335M)
   - (U) Continue Range Control System (RCS). ($.163M)

Program Element: #0604735F
PE Title: Combat Training Ranges

Project Number: 2286
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

2. (U) FY 1994 Planned Program:
   - (U) Continue CTR basic operating support, system software acquisition, and systems engineering support. ($2.912M)
   - (U) Continue to develop (with Navy) interoperability improvements and aircraft interface with range instrumentation pods and software upgrades. ($2.406M)
   - (U) Continue development of AMODSM ($0.108M)
   - (U) Begin development of the JACTS. Includes design/analysis of system requirements and allocation to the subsystem level; software design/ development; interface development for existing government weapon simulations; site surveys; redesign of Government Furnished Equipment and software; design activities related to aircraft interface; and the initiation of prototype pod development. ($10.2M)

3. (U) FY 1995 Planned Program:
   - (U) Continue CTR basic operating support, system software acquisition, and systems engineering support. ($3.0M)
   - (U) Continue JACTS software design and development through Critical Design Review (CDR); develop and test the prototype pod; initiate support equipment development; finalize the hardware design and conduct total test-program planning and initiate the unit level software testing. ($13.2M)
   - (U) Continue to develop (with Navy) interoperability improvements and aircraft interface with range instrumentation pods and software upgrades. ($2.101M)

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

D. (U) WORK PERFORMED BY: This program is managed by the Aeronautical Systems Center, Eglin, AFB FL. The major contractors are Sverdrup Corporation and RMS Technologies, Fort Walton Beach, FL.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None.
2. (U) SCHEDULE CHANGES: AMODSM slipped one year due to delay in contract award because of the number of users and developers required to review and define the system specifications.
3. (U) COST CHANGES: None.

F. (U) PROGRAM DOCUMENTATION:
   - CAF 305-76-I/II/III-G, ORD for Joint Air Combat Training System (JACTS) 20 Aug 93.

G. (U) RELATED ACTIVITIES: Navy funding will also procure JACTS to upgrade their Tactical Air Combat Training System (TACTS). The Navy has begun work on an at-sea instrumentation training system called the Tactical Combat Training System (TCTS), which is larger in scope,

Program Element: #0604735F
PE Title: Combat Training Ranges

Project Number: 2286
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

and more robust than JACTS. Projected IOC for TCTS is 2000. JACTS IOC is FY 1997. There is no unnecessary duplication of effort in the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
34,346	23,903	16,989	17,391	15,396	19,508	21,064	N/A	Cont

Appropriation 3080, Budget Activity OPAF/Electronics & Telecommunications Equipment, Program Title Combat Training Ranges

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
11,197	12,801	26,608	16,320	16,658	17.197	17.891	N/A	Cont

Appropriation 3010, Budget Activity A/C Procurement/Other Production Charges, Program Title: Combat Training Ranges

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE:
- JACTS IOC - FY 97

Program Element: #0604735F
PE Title: Combat Training Ranges

Project Number: 3321
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3321 Electronic Combat Test Resources *								
35,200	0	0	0	0	0	0	N/A	N/A

* This project transferred to PE 0604256F in FY 94.

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: This project develops and acquires the institutional capabilities necessary to support avionics and electronic combat (EC) test and evaluation (T&E) requirements. Included are digital simulations, Hardware-in-the-Loop (HITL) hybrid facilities, Installed Systems Test Facilities (ISTF), and development of range systems used in test and evaluation. The Joint Modeling and Simulation System (J-MASS) is an Air Force-led, Tri-Service project to develop and demonstrate a DoD-wide common digital simulation architecture in support of test and evaluation. HITL facilities funded by this project are the Air Force Electronic Warfare Evaluation Simulator (AFEWES), the Real-Time Electromagnetic Digitally Controlled Analyzer and Processor (REDCAP), and the Radar Test Facility (RTF) which is used for test and evaluation of fielded and prototype Electronic Counter-Counter Measure (ECCM) capabilities of airborne radar weapons and EC systems. This project also funds the ECCM upgrades of three Eglin AFB facilities: the Pre-Flight Integration of Munitions and Electronic Systems (PRIMES) Facility; the Guided Weapons Evaluation Facility (GWEF); and the Electromagnetic Threat Environment (EMTE) range. Rome Laboratory's Newport, Stockbridge and Verona antenna measurement facilities provide a unique, cost-effective capability within the DoD to evaluate the performance of antennas and systems on full-size aircraft testbeds. This project funds the operation, maintenance and upgrades necessary at these facilities to ensure current and evolving technology systems (e.g., F-22) can be adequately supported. This project also funds the upgrade of the ISTF at Edwards AFB, CA called the Electronic Combat Integrated Test (ECIT) capability. Each of these capabilities is an integral and, therefore, essential part of the EC test process required to meet the test requirements of Air Force weapon systems.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) AFEWES upgrade. Completed MEG, IRLE and TWS-10 projects. Continued TDS and RAI (renamed Airborne Interceptor Upgrade (AIU)) projects for FY94 completion. Began Reconfigurable Surface-to-Air Missile (RSAM) project with FY 97 completion.
   - (U) REDCAP upgrade. Completed SUAWACS/BMC3 and facility projects for FY94 completion. Initiated Integration of Air Defense Systems (IADS) upgrade. Began generic link and architecture project.
   - (U) ECCM. Continued PRIMES, GWEF, and EMTE upgrade projects. Fielded two instrumentation upgrades at EMTE.
   - (U) Rome Lab. Established F-22 test bed capability. Completed computer and instrumentation upgrades for Newport and Stockbridge. Completed Newport fiber optics upgrade.
   - (U) RTF. Continued AMRAAM GTU project: Completed Phase I and initiated Phase II.
   - (U) ECIT. Began development of ECIT capability upgrade.

Program Element: #0604735F
PE Title: Combat Training Ranges

Project Number: 3321
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

2. (U) FY 1994 Planned Program: Not applicable.

3. (U) FY 1995 Planned Program: Not applicable.

4. (U) Program to Completion: Not applicable.

D. (U) WORK PERFORMED BY: Portions of this project are managed by ASC, Wright-Patterson AFB, OH; 46 Test Wing, Eglin AFB, FL; Rome Laboratory, Griffiss AFB, NY; and the 84 Test Squadron, Tyndall AFB, FL. Major contractors include Lockheed Corporation, Fort Worth, TX (AFEWES); Calspan Corporation, Buffalo, NY (REDCAP); Hughes Aircraft Corporation, Los Angles, CA; Georgia Tech Research Institute, Atlanta, GA, and Rome Research Corp., Rome, NY.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: Not applicable.
2. (U) SCHEDULE CHANGES: Not applicable.
3. (U) COST CHANGES: Not applicable.

F. (U) PROGRAM DOCUMENTATION:
(U) SAC SON 08-81, 23 Jul 82
(U) AFSC SON 004-89, 6 Dec 89

G. (U) RELATED ACTIVITIES:
(U) Navy and Army also engage in electronic combat T&E infrastructure development programs.
(U) All USAF threat simulator programs, including portions of this project are reviewed by the CROSSBOW-S Committee and the DoD Executive Committee on Threat Simulators (EXCOM).
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): Not Applicable.

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) MILESTONE SCHEDULE: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604740F
PE Title: Computer Resource Technology Transition (CRTT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

DATE: FEBRUARY 1994

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

	FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
2522 Advanced Comp Tech Trans	2,348	2,662	2,625	2,770	2,707	2,791	2,909	Cont	TBD
2523 Architectural Implementation	1,890	1,918	1,427	1,424	1,395	1,537	1,669	Cont	TBD
2524 Reuse and Component Sup	9,783	6,811	0	0	0	0	0	Cont	TBD
2525 Critical Software Research	3,307	0	0	0	0	0	0	Cont	TBD
3315 Digital Info Tech Trans	2,834	2,440	2,569	2,366	2,511	2,521	2,546	Cont	TBD
Total	20,162	13,831	6,621	6,760	6,613	6,849	7,124	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: Specifically, the Computer Resource Technology Transition (CRTT) program addresses problems of acquiring, developing, and supporting emerging computer resources. The goal of this program is to reduce software lifecycle costs and to improve the quality of computer systems development and support. This is the only Air Force program for transitioning software technology across the board into the USAF (rather than into a specific acquisition program).

Program Element: 0604740F
PE Title: Computer Resource Technology Transition (CRTT)
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Old Budget Activity: #4 -Tactical Programs

DATE: FEBRUARY 1994

(U) The program consists of five major projects. Project 2522 will establish the foundational elements of an effective methodology to support technology transition efforts program-wide and will provide for implementation of technology receptor groups and development of methodology to support transitioned capability. Project 2523 will initially address a particular instantiation, namely command and control architectures, of reusable technology which are available or can be developed in the near term. Project 2524 is a Congressional special interest item and will address the technologies/processes inherent in operating and maintaining a domain central repository of software, software algorithms, and reusable technologies. Project 2525 is a Congressional special interest item that will address research on software reliability for critical systems. Project 3315 will provide a totally integrated capability to create, accept, retrieve and store digital (paperless) technical information for life cycle support for Air Force logistics. CRTT is an engineering development program that transitions technology into operational Air Force organizations.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

(U) Project 2522, Advanced Computer Technology Transition: Develop, through interaction with AF MAJCOMs, tools and technologies for improving the software development environment and processes and accelerating transition of software technology to the users. Emphasis will be placed on identifying software technology items which provide the best return on investment and setting up receptor groups at the user organizations that support transition and productization.

(U) FY 1993 Accomplishments:
- (U) - Began development of technology transition infrastructure within the Air Force (668K).
- (U) - Continue funding JLC activities in software re engineering and modernization of obsolescent, expensive software (300K).
- (U) - Installed Pro-SLCSE at Ogden Air Logistics Center and trained users (980K).
- (U) - Completed Ada9X compiler development/testing (250K).
- (U) - Provided user training of technology transition management courses (150K).

(U) FY 1994 Plans:
- (U) - Continue to develop technology transition infrastructure within the Air Force (1112K).
- (U) - Continue funding JLC activities in software re engineering and modernization of obsolescent, expensive software (300K).
- (U) - Transition technology transition management courses to AF users (100K).
- (U) - Continue transitioning software process improvement methods into Air Force software Central Design Activities (CDAs) (150K).
- (U) - Begin development and implementation of Air Force-wide metrics repository (1,000K).

Program Element: 0604740F
PE Title: Computer Resource Technology Transition (CRTT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 -Tactical Programs

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(U) FY 1995 Plans:
- (U) - Continue to develop technology transition infrastructure within the Air Force (1325K).
- (U) - Continue funding JLC activities in software re engineering and modernization of obsolescent, expensive software (300K).
- (U) - Complete development and continue to implement Air Force-wide metrics repository (1,000K).

(U) WORK PERFORMED BY: Work is performed by International Software Systems, Unisys, Mosaic, Horizon's Technology and the Software Engineering Institute.

(U) RELATED ACTIVITIES: The following Air Force programs offer broad-based technology solutions:
- (U) - Program Element #0603728F, Advanced Computer Technology
- (U) - Program Element #0603752F, DoD Software Engineering Institute
- (U) - There is no unnecessary duplication of effort within the Air Force or the DoD.

(U) OTHER APPROPRIATION FUNDS : Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

(U) Project 2523, Architectural Implementation: Develop, through rapid prototyping and interaction with Air Force users, a tailorable architecture for support of command and control applications. The architecture will address the components common to most command centers (e.g., message processing, display processing, user interfaces) and will focus on the migration of multilevel computer security applications/technologies into AF operations. This project is needed to mitigate development time associated with command center acquisitions so that the system is not obsolete when delivered.

(U) FY 1993 Accomplishments:
- (U) - Completed domain analysis for command centers and validated tailorable command center architecture (600K).
- (U) - Qualified software components for use in tailorable command centers and provide rapid prototyping (600K).
- (U) - Continued identifying multilevel security issues/solutions and SecurityPro/Transition Analysis Facility (STAF) testing, analysis and technology transition (600K).

(U) FY 1994 Plans:
- (U) - Update tailorable command center architecture and continue to qualify software components (1,018K).
- (U) - Continue development of Command Center Concept of Operations (100K).
- (U) - Continue identifying multilevel security issues/solutions and STAF testing, analysis and technology transition (800K).

Program Element: 0604740F
PE Title: Computer Resource Technology Transition (CRTT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 -Tactical Programs

DATE: FEBRUARY 1994

(U) FY 1995 Plans:
- (U) - Update tailorable command center architecture and continue to qualify software components (800K).
- (U) - Continue development of Command Center Concept of Operations (100K).
- (U) - Continue identifying multilevel security issues/solutions and STAF testing, analysis and technology transition (527K).

(U) WORK PERFORMED BY: Work is performed by Raytheon and Hughes Aircraft.

(U) RELATED ACTIVITIES: The following Air Force programs offer broad-based technology solutions:
- (U) - Program Element #0303401F, Communications Security
- (U) - There is no unnecessary duplication of effort within the Air Force or the DoD.

(U) OTHER APPROPRIATION FUNDS: Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

(U) Project 2524, Reuse and Reusable Component Support. Develop a documented knowledge for establishing software reuse libraries that support specific application domains. These libraries will support system engineers through the reuse of large scale software components. This program is needed so that the Air Force can reuse software that it has already purchased by developing a central repository of software and software algorithms. Reusing software will result in lower software development costs, faster software development schedules, and lower software development risks.

(U) FY 1993 Accomplishments:
- (U) - Demonstrated interoperability to two other reuse libraries (300K).
- (U) - Initial action to apply reuse blueprint to other domains (250K).
- (U) - Continued to populate library with software artifacts (500K).
- (U) - Continued implementation of blueprint (8,650K).

(U) FY 1994 Plans:
- (U) - Provide knowledge to others on establishing domain-based reuse (300K).
- (U) - Support Domain Specific Prototyping (300K).
- (U) - Initial transition of blueprint to DoD (100K).
- (U) - Continue to populate library with software artifacts (500K).
- (U) - Continue refinement of blueprint (5,611K).

Program Element: 0604740F
PE Title: Computer Resource Technology Transition (CRTT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 -Tactical Programs

DATE: FEBRUARY 1994

(U) FY 1995 Plans: (no funding since Congressional special interest item)
- (U) - Provide knowledge to others on establishing domains and reuse.
- (U) - Support Domain Specific Prototyping.
- (U) - Continue transition of blueprint to DoD.
- (U) - Continue to populate library with software artifacts.
- (U) - Continue refinement of blueprint.

(U) WORK PERFORMED BY: Work is performed by PARAMAX, DSD Laboratories, Azimuth Inc., D.N. American, Galaxy Global Corp., and EWA.

(U) RELATED ACTIVITIES: Not Applicable.

(U) OTHER APPROPRIATION FUNDS : Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

(U) Project 2525, Critical Software Research: Perform research in formal methods for software development. Research will verify selected properties of a software specification, capture design decisions taken at every level of abstraction, and automate the process of implementation from a specification. This will improve the modularity and reusability of software designs.

(U) FY 1993 Accomplishments:
- (U) - Developed proof of concept experiment of an alternate method of developing software (781K).
- (U) - Developing a message translation and validation software application (666K).
- (U) - Developing needed tools for new software design method (1,038).
- (U) - Developed a transition plan for AF use (822K).

(U) FY 1994 Plans (Efforts continue with FY 1993 funds):
- (U) - Collect metrics on new software development method.
- (U) - Complete development of a message translation and validation software application.
- (U) - Complete development of needed tools for new software design method.
- (U) - Begin implementing technology transition plan.

Program Element: 0604740F
PE Title: Computer Resource Technology Transition (CRTT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 -Tactical Programs

DATE: FEBRUARY 1994

(U) FY 1995 Plans:
(U) - None.

(U) WORK PERFORMED BY: Work is performed by Pacific Software Research Center, Oregon Graduate Institute and Draper Labs.

(U) RELATED ACTIVITIES: Not Applicable.

(U) OTHER APPROPRIATION FUNDS : Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

(U) Project 3315, Digital Information Technology Transition: DOD Defense Guidance and Office of the Secretary of Defense (OSD) funding initiatives have emphasized the need to improve the preparation, delivery, use and updating of digital technical information used in the design, manufacture, maintenance, and operation of DOD weapon systems. This project is needed to transition from a paper-intensive weapon system acquisition and support process to a largely automated and integrated mode of operations. This will allow the Air Force to create data once and use it many times.

(U) FY 1993 Accomplishments:
(U) - Updated Air Force CALS Strategic Plan/Roadmap (273K).
(U) - Began developing AF CALS implementation Plan (240K).
(U) - Planned and executed AF participation in CALS EXPO 93 (100K).
(U) - Continued development of technical standards/specifications (868K).
(U) - Continued paperless acquisition effort (865K).
(U) - AF support for ABET (488K).

(U) FY 1994 PLANNED PROGRAM:
(U) - Continue development of technical standards/specifications (1,195K).
(U) - Plan and execute AF participation in CALS EXPO 94 (85K).
(U) - Develop test cases for AF infrastructure to implement CALS (485K).
(U) - Continue paperless acquisition effort (450K).
(U) - Transition AF CALS Strategic Plan/Roadmap into electronic document (225K).

Program Element: 0604740F
PE Title: Computer Resource Technology Transition (CRTT)
Budget Activity: #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 -Tactical Programs

DATE: FEBRUARY 1994

(U) FY 1995 Plans:
- (U) - Continue to develop and implement technical standards/specifications (1,329K).
- (U) - Continue paperless acquisition effort (1,000K).
- (U) - Integrate AF CALS Implementation Plan with AF CALS Strategic Plan into AF CALS Strategy (240K).

(U) WORK PERFORMED BY: Work is performed by RJO Enterprises, Rockwell, Intl., LOGTEC, SelecTech, and International Consultants, Inc.

(U) RELATED ACTIVITIES: Not Applicable.

(U) OTHER APPROPRIATION FUNDS : Not Applicable.

(U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not Applicable.

FY1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604750F
PE Title: Intelligence Equipment
Budget Activity: #5 - Engineering & Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

A: (U) **RESOURCES ($ in Thousands)**

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	TO Complete	TOTAL Program
2053 Foreign Aerospace Science & Technology Center Intelligence Processes								
2,853	2,859	2,633	2,650	2,574	2,698	2,808	Continuing	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element supports USAF operating commands by performing the engineering development of ground equipment and/or techniques to streamline the processing, integration, display and distribution of intelligence data. Developed software will reduce the time required for the exploitation of intelligence data by Air Force agencies producing strategic, tactical, and scientific and technical intelligence products. Also, equipment/techniques are developed to counter the foreign intelligence threat to the USAF mission.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995

(U) Project 2053, Foreign Aerospace Science & Technology Center (FASTC) Intelligence Processes: This project provides continuing development and upgrade of National Aerospace & Intelligence Center (NAIC)(formerly FASTC) threat analysis capabilities through development/integration of Analysis System Software and through refinement/improvement of Analysis Methodologies and Individual Analysis Tools. FASTC is tasked with providing detailed foreign technology intelligence information to a variety of both DOD/NONDOD customers. In the past few years, customer's requirements have become more sophisticated, dictating more detailed and timely intelligence not only in the technology regime but also in the economic, world crisis and political arenas. Rome Laboratory must develop new intelligence analysis technology to provide the capability to NAIC dictated by evolving world events.

(U) FY 1993 Accomplishments:
(U) - Complete Elint Expert Tutor ($0.4M).
(U) - Complete Ground Attack Fighter Model ($0.4M).
(U) - Complete Electromagnetic Antenna Model ($0.2M).
(U) - Continue Communications Network Model ($0.3M).
(U) - Continue Bomber Penetration II Study ($0.2M).
(U) - Complete ECM Techniques and IR Flare Modeling ($0.2M).

Program Element: #0604750F
PE Title: Intelligence Equipment
Budget Activity: #5 - Engineering & Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Continue Low Observable Design Synthesis Tool ($0.25M).
(U) - Initiated RF Weapons Modeling Effort ($0.5M).
(U) - Initiated Infrared Signature Modeling ($0.4M).

(U) FY 1994 Plans:
(U) - Complete Communications Network Model ($0.3M).
(U) - Complete Bomber Penetration II Study ($0.25M).
(U) - Complete Low Observable Design Synthesis Tool ($0.3M).
(U) - Complete ECM Techniques and IR Flare Modeling ($0.35M).
(U) - Continue Infrared Signature Modeling ($0.4M).
(U) - Continue RF Weapons Modeling Effort ($0.5M).
(U) - Initiate Air Surveillance C3 Modeling ($0.3M).
(U) - Initiate Air Combat Simulation & Reconstruction Model ($0.3M).
(U) - Initiate Low Energy Laser Engineering Model ($0.15M).

(U) FY 1995 Plans:
(U) - Complete RF Weapons Modeling ($0.5M).
(U) - Complete Infrared Signature Modeling ($0.4M).
(U) - Continue Air Surveillance C3 Modeling ($0.35M).
(U) - Continue Air Combat Simulation & Reconstruction Model ($0.35M).
(U) - Continue Low Energy Laser Engineering Model ($0.15M).
(U) - Initiate ARM RF Environment Model ($0.7M).
(U) - Initiate SAR Model Upgrade ($0.15M).

(U) Work Performed By: Rockwell Power Systems, Albuquerque, NM. General Research Corporation, Dayton, OH. McDonnell Douglas, St Louis MO. Toyon Research, Santa Barbara, CA. Adroit Systems, Alexandria, VA. Photon Research, La Jolla, CA.

(U) Related Activities: PE 0301310F (FASTC)

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

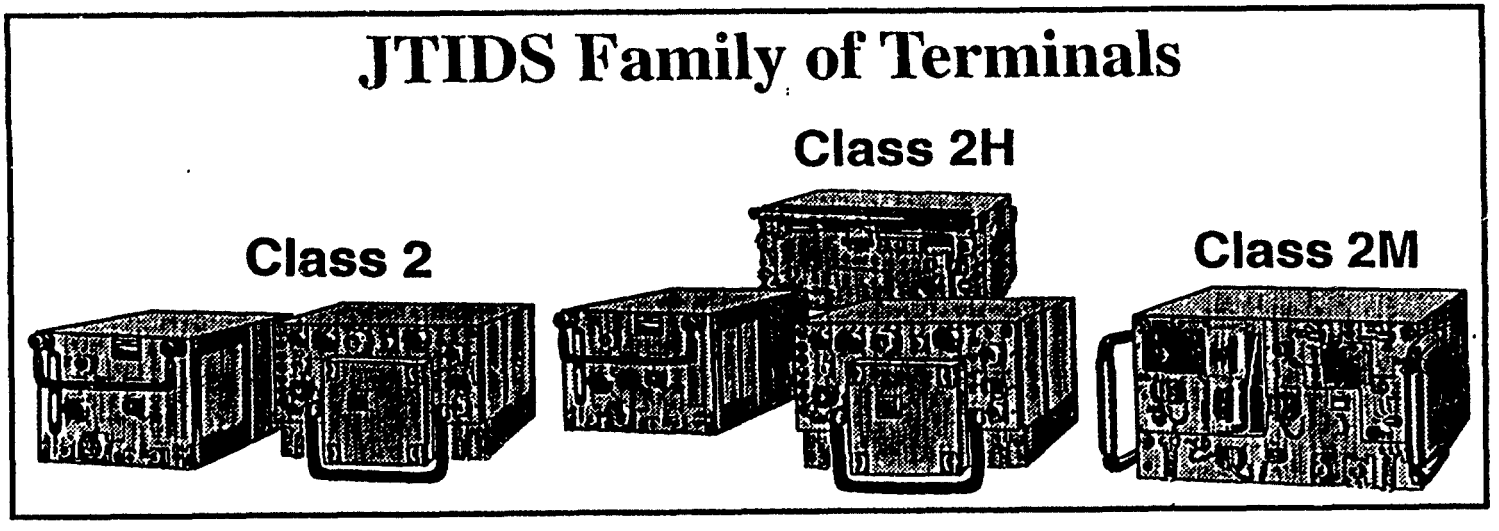
FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604754F
PE Title: Joint Tactical Information Distribution System (JTIDS)

Project Number: P771
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

Project Title: Joint Tactical Information Distribution System



Program Element: #0604754F
PE Title: Joint Tactical Information Distribution System

Project Number: P771
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

POPULAR NAME: JTIDS

A. (U) SCHEDULE/BUDGET INFORMATION ($ in Thousands):

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones		OSD/C3I Review 2QTR	Milestone III 2QTR					
Engineering Milestones	N/A							
T&E Milestones		OT-IID 1QTR	F-15 OUE Comp 1QTR JSTARS IOT&E 4QTR	Multiservice Operational Test - III 2QTR	MCE IOT&E 1QTR			
Contract Milestones	Lot 4 LRIP	Lot 5 LRIP	Full Rate Production					
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**F 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	8,364	7,887	6,464	8,988	9,022	9,391	9,617	Continuing
Support Contract	1,408	643	2,161	2,228	2,051	2,051	2,051	Continuing
In-House Contract	871	2,329	2,367	2,244	1,823	1,567	1,556	Continuing
GFE/Other	4.493	500	642	738	747	804	811	Continuing
Total	15,140	11,359	11,634	14,198	13,643	13,813	14,035	Continuing

Program Element: #0604754F
PE Title: Joint Tactical Information Distribution System
Project Number: P771
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: JTIDS is a Budget Activity 5, Engineering and Manufacturing Development effort to provide Army, Navy, Air Force and Marine Theater Command and Control (C2) elements with a secure, jam resistant, high capacity data link communications system for use in a tactical combat environment. The Joint Tactical Information Distribution System (JTIDS) family of terminals (Class 2 & 2H for Air Force, Navy and Marine Corps; and 2M for Army) is a joint development program which employs Time Division Multiple Access (TDMA), and spread spectrum techniques. JTIDS will permit rapid and secure exchange of essential command, control, and status information among all terminals in the tactical theater.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Began final restucture of all software to Common Central Processing Unit (CPU). ($3.4M)
   - (U) - Redirected Integrated Logistic Support Equipment (ILSE) resources to complete Built In Test (BIT) for the Class 2/2H terminals to support the Air Force two level maintenance concept. ($1.1M)
   - (U) - Low Rate Initial Production (LRIP) Lot 4 (Navy, MCE, E-3, and E-8) was awarded Sep 93. (Funded by respective platform PEs)
   - (U) - Accepted delivery of LRIP Lot 2 (Navy and E-3) terminals. (Funded by respective platform PEs)
   - (U) - Began an Affordability/Manufacturing Technology Demonstration (AMTD). ($3.3M)
   - (U) - Continued interoperability support. ($1.5M)
   - (U) - Continued support to Mountain Home Fighter Data Link Operational Utility Evaluation (FDLOUE). ($1.4M)
   - (U) - Airborne Battlefield Command and Control Center (ABCCC) Operational Concept Demonstration (OCD) was accomplished Aug 93. ($0.4)
   - (U) - OMNIBUS Reprogramming. ($4.0M)

2. (U) FY 1994 Planned Program:
   - (U) - OASD(C3I)T&TC3 Review to obtain Class 2/2H LRIP Lot 5 and Class 2M Lot 1 approval. (Funding - N/A)
   - (U) - Achieve 500 hour (Lab) Mean Time Between Failure (MTBF) for Class 2/2H and Ship terminals. ($0.6M)
   - (U) - Award LRIP Lot 5 Contract (Class 2/2H/2M). (Funded by respective platform PEs)
   - (U) - Continue terminal software/hardware updates. ($3.8M)

Program Element: #0604754F
PE Title: Joint Tactical Information Distribution System

Project Number: P771
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Continue system integration and software development for E-3, E-8, ABCCC, Modular Air Operations Center (MAOC), and Modular Control Equipment (MCE). ($2.8M)
(U) - Continue Logistics support for Interface Software Support Activity (ISSA) and in the depot in upgrading techniques, services, and equipment to accomodate new developments in the Class 2 family of terminals. ($1.6M)
(U) - Continue test and evaluation of enhancements and upgrades in response to anticipated changes in threat, mission, and system applications. ($0.9M)
(U) - Accept deliveries of LRIPs Lot 2 and 3 (Class 2/2H) terminals. (Funding - N/A)
(U) - Support multi-service OCD in support of Theater Missile Defense (TMD) development. ($0.5M)
(U) - Establish Interim Contractor Support (ICS) until organic depots are operational. (Funded by respective platform PEs)
(U) - Continue support to Mountain Home FDLOUE. ($0.5M)
(U) - Continue interoperability support to the Air Force platforms (E-3, E-8, ABCCC, MCE & MAOC). ($0.7M)

3. (U) FY 1995 Planned Program:
(U) - Incorporate Formal Qualification Testing (FQT)-5B updates into Lot 4 terminals. ($1.5M)
(U) - Milestone III Defense Acquisition Board (DAB) decision and award Full Rate Production (FRP) contract. (Individual platform production funds will be used.)
(U) - Continue system integration and software development for E-3, E-8, ABCCC, MAOC, and MCE. ($4.6M)
(U) - Accept deliveries of LRIPs Lot 3 (Class 2/2H) terminals. (Funding - N/A)
(U) - Continue support for ISSA. ($2.5M)
(U) - Complete Mountain Home FDLOUE. ($0.5M)
(U) - Continue support to the development of improved interoperability practices and techniques in response to changes in System Threat Analysis Report (STAR). ($2.5M)
(U) - Continue ICS until organic depots are operational. (Funded by respective platform PEs)

4. (U) Program to Completion:
(U) - Accept deliveries of LRIP Lot 4 and 5 terminals

Program Element: #0604754F
PE Title: Joint Tactical Information Distribution System
Project Number: P771
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

(U) - Continuing support to the development of improved interoperability practices and techniques in response to changes in system threat analysis report.
(U) - Complete activation of ISSA depots.
(U) - Complete procurement of all Air Force terminals.
(U) - Complete testing, system integration and software development for all platforms.

D. (U) WORK PERFORMED BY: The Joint Program Office is located at the Electronic Systems Center (ESC), Hanscom AFB MA. Work is also being done at the Aeronautical Systems Center (ASC), Wright-Patterson AFB OH; and the Electromagnetic Compatibility Analysis Center (ECAC), Annapolis MD. Major contractors are: GEC-Marconi Electronic Systems Corp (GEC-MESC), Wayne NJ; Rockwell-Collins, Cedar Rapids IA; Boeing Aerospace Company, Seattle, WA; Grumman Melbourne Systems Division, Melbourne FL; Litton Data Systems, Van Nuys CA; McDonnell Douglas Aircraft Corporation, St Louis MO; and MITRE Corporation, Bedford MA.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None
2. (U) SCHEDULE CHANGES: Milestone III slipped one year
3. (U) COST CHANGES: None

EXPLANATION:
1. (U) Technical: N/A
2. (U) Schedule: Milestone III slipped from Feb 94 to Feb 95 due to the delay in Navy OPEVAL. An OASDC3I/T&TC# review will be held in Feb 94 to obtain approval for a LRIP Lot 5.
3. (U) Cost: N/A

F. PROGRAM DOCUMENTATION:
(U) - Tactical Air Forces Statement of Operational Need (TAF SON) 703-73, November 1973
(U) - JTIDS System Operations Concept (SOC), 15 March 1987

Program Element: #0604754F
PE Title: Joint Tactical Information Distribution System

Project Number: P771
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs

Date: February 1994

(U) - Decision Coordinating Paper (DCP, 6 June 1989
(U) - Joint Integrated Logistics Support Plan, 30 December 1992
(U) - Multiple Required Operational Capability (MROC) MJCS-193-89, 16 August 1989
(U) - JTIDS Program Baseline, 10 July 1991
(U) - Acquisition Decision Memorandum, 11 October 1989
(U) - System Operational Requirements Document (SORD), TAF-306-74-I/II/III-A, Rev 1, 8 November 1991
(U) - Test and Evaluation Master Plan (TEMP), 16 February 1993.

G. RELATED ACTIVITIES:
(U) - Program Element #27130F F-15
(U) - Program Element #27581F, #64770F E-8 Joint STARS
(U) - Program Element #27417F E-3 AWACS and Airborne Battlefield Command and Control Center (ABCCC)
(U) - Program Element #27412F Tactical Airborne Command & Control System - Modular Control Equipment (MCE) and Modular Air Operations Center (MAOC)
(U) - Program Element #27417F Airborne Battlefield Command and Control Center (ABCCC)
(U) - Program Element #28019F Tactical Cryptologic Activities
(U) - There is no unnecessary duplication of effort within the Air Force or Department of Defense.
(U) - Joint Program Designator (JPD) to be determined at Milestone III.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands): N/A

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: A Memorandum of Understanding (MOU) between the UK and US Government is in effect and under review by the UK and US Government. The UK is purchasing JTIDS terminals both through direct commercial contract and through FMS procedures.

Program Element: #0604754F
PE Title: Joint Tactical Information Distribution System
Project Number: P771
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity: #4 - Tactical Programs
Date: February 1994

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Joint AF/Navy MS-OT-I	3/92	M/S test to support Lot 3 exit criteria.

Event	Date	Results
Joint AF/Navy MS-OT-II	9/92	AF/Navy interoperability in an EW environment - supports MS III.
TEMP	2/93	OSD and services aproved.

T&E ACTIVITY (TO COMPLETION)

F-15 FDLOUE	10/94	Complete evaluation flights and report results.
MS-OT-III	9/96	AF/Army interoperability in an EW environment.

FY 1995 RDT&E DES .RIPTIVE SUMMARY

Program Element: #0604759F
PE Title: Major T&E Investment
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

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

FY93 Actual *	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2880 4950th Test Wing (4950TW)								
1,843	**						N/A	N/A
3120 Air Force Development Test Center (AFDTC)								
17,585	15,457	16,604	20,624	18,291	22,685	21,864	Cont	TBD
3285 Arnold Engineering Development Center (AEDC)								
10,935	10,924	10,499	7,690	8,106	7,841	8,758	Cont	TBD
3323 Cruise Missile Mission Control Aircraft (CMMCA)								
2,200	1,400						Cont	TBD
3324 HAVE LINK								
476	***						Cont	TBD
3620 Air Force Flight Test Center (AFFTC)								
13,855	21,658	25,427	31,595	31,166	30,534	31,128	Cont	TBD
4282 Developmental Manufacturing & Modification Facility (DMMF)								
0	1,076	1,014	1,100	1,107	1,118	1,127	Cont	TBD
Total								
46,894	50,515	53,544	61,009	58,670	62,178	62,877	Cont	TBD

* FY93 and prior funded in PE 64755F. As a result of the FY94 OSD Program Budget Decision review, the title of this PE was changed from "Improved Capability for DT&E" to the current title.
** Transferred to AFFTC project 3620.
*** Included in Individual Centers.

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program ensures the Air Force members of the DoD Major Range and Test Facilities Base (MRTFB) that test and evaluation technologies are compatible with the systems they are required to test. This program provides planning, improvements, and modernization for test capabilities at three MRTFBs (AEDC, AFFTC, and AFDTC: Note, The 4950TW will split in 1994 with the aircraft mission going to BPAC 3620-AFFTC and the DMMF mission staying at WPAFB under BPAC 4282). The fluctuations in the funding at these locations are the result of changing priorities in the improvement and modernization requirements as defined through the AF Test Investment Planning & Programming Process and documented in the AF Test Investment Strategic Plan. Also all projects have been reviewed through the Tri-Service Reliance effort (to communicate AF efforts to the other services and avoid

Program Element: #0604759F
PE Title: Major T&E Investment
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unwarranted duplication of effort) and are documented in the Test Capability Master Plans. Further, each specific project has its own planning, development, equipment acquisition/facility construction, equipment installation, and checkout phases which often requires significant differences in funding from one year to the next. As such, the changes in funding from year to year do not necessarily indicate program growth but rather a planned phasing of improvement and modernization efforts. The test capabilities at these centers enable testing through all phases of weapon system acquisition from system concept exploration through component and full scale integrated weapon system testing to operational testing. These three test centers have over $10B worth of unique test facilities/capabilities. They are a national asset operated and maintained by the Air Force for DoD test and evaluation missions, but they are available to others having a requirement for their unique capabilities.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project: 2880, 4950th Test Wing: The 4950TW, Aeronautical Systems Center, Wright-Patterson AFB, OH, performs flight testing of aircraft and airborne systems and supports space vehicle tracking for the AF, other DoD agencies, and NASA. Staging out of U.S. and overseas bases, the Advanced Range Instrumentation Aircraft (ARIA) provide telemetry support for NASA and DoD missile launches. The Cruise Missile Mission Control Aircraft (CMMCA) will support cruise missile and RPV testing. The CMMCA project funds development of critical Software Development System (SDS) and spares necessary for initial maintenance of CMMCA aircraft. The Integrated Data Facility (IDF) consists of a ground-based laboratory module, a real-time test data monitoring module, and a module for improved data computation and analysis. The IDF enables secure data processing and software modifications necessary for conduct of ARIA, CMMCA, and Advanced Radar Test Bed (ARTB) missions. IDF is the link between the 4950TW aircraft and the host base data processing system; therefor, the completed IDF will move to Edwards AFB to help beddown the 4950TW aircraft.

(U) FY 1993 Accomplishments:
- (U) Completed Integrated Data Facility (IDF) program with the real time test data monitoring module and prepared for move and integration at Edwards AFB. ($1.200M)
- (U) Equipment installation and ground testing of cruise missile support aircraft. ($0.600M)

(U) FY 1994 Plans:
Note: Transfer of the 4950TW to AFFTC is scheduled to begin in FY 94. Funding realigned under AFFTC BPAC 663620. The Developmental Manufacturing and Modification Facility (DMMF) remains at Wright-Patterson AFB, OH, with upgrades identified in BPAC 664282.

(U) FY 1995 Plans: Not applicable.

Program Element: #0604759F
PE Title: Major T&E Investment
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) Work Performed By: Multiple contractors.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) Project: 3323, Cruise Missile Mission Control Aircraft (CMMCA): The CMMCA will consolidate telemetry support, mission control functions, radar safety chase, and flight following capabilities into a single airborne platform. As such, CMMCA will replace visual safety chase for most cruise missile test missions resulting in significant savings.

(U) FY 1993 Accomplishments:
- (U) Conducted system level flight testing on first aircraft (#893). Program reevaluation resulted in additional testing of radome and radar. Completed aircraft #893 Programmed Depot Maintenance (PDM), reinstalled equipment. Installed mission equipment in aircraft #895, completed air worthiness testing, and began system evaluation. Purchased support equipment and system documentation. ($2.200M)

(U) FY 1994 Plans:
- (U) Conduct final systems flight testing and deliver a/c #893 (IOC) and a/c #895 (FOC). Program to be completed in FY94. ($1.400M)

(U) FY 1995 Plans: Not applicable.

(U) Work Performed By: Chrysler Technologies Airborne Inc., Waco, TX.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not applicable.

(U) International Cooperative Agreements: Not applicable.

3. (U) Project: 3324, HAVE LINK: The Air Force HAVE LINK program implements Office of the Secretary of Defense direction to increase operational security on sensitive unclassified information and test data on test ranges. The HAVE LINK program

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PE Title: Major T&E Investment
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

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implements corrective measures to eliminate identified vulnerabilities subject to exploitation by hostile intelligence collection agencies.

(U) FY 1993 Accomplishments:
- (U) 4950TW: Complete purchased installation of UHF Secure SATCOM equipment on ARIAs. ($0.476M)

(U) FY 1994 Plans:
- (U) This project has completed the macro level objectives and will be worked as necessary, at under $100K increments, by the individual centers.

(U) FY 1995 Plans:
- (U) This project has completed the macro level objectives and will be worked as necessary, at under $100K increments, by the individual centers.

(U) Worked Performed By: Digital Equipment Corporation, Pittsburgh, PA; Motorola, Inc., Scottsdale, AZ; Dome & Margolin, Inc., Bohemia, NY; Mykotronics LA, CA; Andrew Corp., Orland Park, IL; various GSA vendors; and AFFTC, AEDC, and AFDTC in-house resources.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not applicable.

(U) International Cooperative Agreements: Not applicable.

4. (U) Project 4282, Developmental Manufacturing and Modification Facility (DMMF): This T&E support project is located at ASC, Wright-Patterson AFB OH. It was created as a result of the 4950th Test Wing consolidation with AFFTC and became a separate ASC organization on 1 Oct 93. Its mission is to provide engineering design and analysis, fabrication, and aircraft modification support to the AF MRTFB. The DMMF accomplishes structural, electrical, and/or aerodynamic aircraft modifications to support the installation of systems and components for flight test; fabrication and installation of flight test instrumentation; installation, support, and upgrade of aircraft test bed projects, (i.e., ARIA, ECCM/ARTB, etc.); engineered demodifications of test projects; and is the AFMC functional manager for T-2 modifications. In addition, the DMMF designs and fabricates ground equipment to support aircraft test operations, test articles, and ground test facility modifications and test support components. The DMMF has approximately 400 personnel, three aircraft modification hangars, a 200,000 sq. ft. shop floor with 48 Computer Numerically Control (CNC) machine tools, and an integrated computer-aided design and manufacturing capability. This PE funds

Program Element: #0604759F
PE Title: Major T&E Investment
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indirect labor and supporting expenses required for this mission. This includes maintaining engineering, fabrication, and computer/communication systems and equipment.

(U) FY 1993 Accomplishments: Prior to FY 1994, the DMMF was part of the 4950th Test Wing. Beginning in FY 1994, the DMMF is under a separate BPAC (664282).

(U) FY 1994 Plans:
- (U) Continue upgrade of T&E aircraft modification and manufacturing equipment. ($0.400M)
- (U) Continue upgrade of computer aided engineering equipment. ($0.426M)
- (U) Continue upgrade of computer integrated manufacturing equipment. ($0.250M)

(U) FY 1995 Plans:
- (U) Continue upgrade of T&E aircraft modification and manufacturing equipment. ($0.400M)
- (U) Continue upgrade of computer aided engineering equipment ($0.414M)
- (U) Continue upgrade of computer integrated manufacturing equipment ($0.200M)

(U) Work Performed By: Science Applications International Corp (SAIC) and in-house resources.

(U) Related Activities:
- (U) There is no unnecessary duplication of effort within the Air Force and the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604759F
PE Title: Major T&E Investment

Project Number: 3285
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3285 Arnold Engineering Development Center (AEDC)								
10,935	10,924	10,499	7,690	8,106	7,841	8,758	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: AEDC, Arnold AFB, TN, provides ground environmental test support for DoD aeronautical, missile, and space programs. The center has 53 test facilities providing: aerodynamic testing of scale model aircraft, missile, and space systems; testing of large and full-scale satellites, sensors, and space vehicles in a simulated space environment; altitude environmental testing for aircraft, missile, and spacecraft propulsion systems; and testing of large-scale models such as space boosters together with their propulsion systems. The Large Rocket Test Facility (J-6) will enable safe testing of solid propellant rocket motors at simulated altitude conditions. MILCON funding provides for construction while funds in this project provide for the testing and activation of the actual J-6 facility. The Improved Ballistic Range program provides critical soft launch ballistic capability. The AEDC Data Acquisition and Processing System provides processing capability for advanced turbine engine testing on programs like the F-22. This effort also upgrades data systems for the arc heaters and hypervelocity gun facility for Theater High Altitude Air Defense (THAAD) testing. Inefficiencies in these current data systems result in increased program costs and schedule delays. The Test Unit Support System (TUSS) project replaces antiquated control systems with automatic control systems in jet engine and rocket engine test facilities to improve efficiency. The Fighter Engine Test Capability will upgrade engine test cells to accommodate higher thrust engines with axisymmetric vectored exhaust nozzles. The J-4 facility will be modified to support liquid rocket motor testing. The Computer Aided Design/Computer Aided Manufacturing (CAD/CAM) project will provide increased capability for data processing and storage and provide wider availability of workstations. Comprehensive ground test capability will be optimized through coordinating studies of the Weather/Erosion Ground Test Improvement project. The Range G Flyer Plate Upgrade will augment current capability to produce the effects of high velocity orbital debris impact and kinetic energy weapons on space systems. The test article injection system for the hypersonic wind tunnels will be automated and modernized through the Hypersonic A/B/C Injection System project.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Continued J-6 project support in technical/management oversight of construction, technical support to construction contractor, base support services, Management Information System (MIS) operations/maintenance. Reviewed activation/validation resource requirements. ($3.4M)
   - (U) Continued AEDC Data Acquisition and Processing System with acquisition/installation of work stations and data processors. ($3.1M)
   - (U) Continued TUSS project with control systems acquisition. IOC was obtained in C-1 engine test cell. ($0.9M)

Program Element: #0604759F
PE Title: Major T&E Investment

Project Number: 3285
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

D. (U) WORK PERFORMED BY: AEDC, Arnold AFB TN, support contractors (Calspan Corp, Sverdrup Technology, Inc, and SSI Services, Inc) and AEDC in-house resources.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) TECHNICAL CHANGES: Not Applicable.
2. (U) SCHEDULE CHANGES: Not Applicable.
3. (U) COST CHANGES: No net change. FY94 TUSS project funded using PIF.

F. (U) PROGRAM DOCUMENTATION: PMD 2164(6)/0604755F, Improved Capability for DT&E.

G. (U) RELATED ACTIVITIES:
(U) PE 0604940D, Test Instrumentation Development.
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.
(U) This project has been coordinated through the Project Reliance process to harmonize efforts and eliminate unwarranted duplication.

H. (U) OTHER APPROPRIATION FUNDS:

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3300, Budget Activity: Defense-Wide Mission Support, Program Title: Hi-Temp Facility Upgrade								
			19,000	19,000			0	38,000
Appropriation: 3300, Budget Activity: Defense-Wide Mission Support, Program Title: Weather Erosion Imp								
			4,000				0	4,000

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: This is a continuing project.

Program Element: #0604759F
PE Title: Major T&E Investment

Project Number: 3285
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

- (U) Continued Improved Ballistic Range project achieving IOC on dedicated Impact Facility and Impulse Tunnel. The larger bore launcher was installed. ($3.5M)

2. (U) FY 1994 Planned Program:
   - (U) Continue J-6 project support in technical and management oversight of construction, technical support to construction contractor, base support services, and MIS operations and maintenance. Continue site activation/validation. ($4.050M)
   - (U) Continue AEDC Data Acquisition and Processing System with installation of additional work stations/processors. The capability will support all tri-Service large turbine engine development testing as agreed to by the OSD Test Reliance effort. ($3.589M)
   - (U) The CAD/CAM user requirements will be validated and a preliminary system specification will be completed at a System Requirements Review. The system preliminary design will be completed and the first procurement increment will be issued. ($0.400M)
   - (U) Begin upgrade of Engine Test Facility (ETF) to support fighter aircraft advanced engines by providing unique national capability to test axisymmetric exhaust nozzles at simulated flight conditions. This upgrade will also increase the thrust rating of the propulsion cell, allowing these more economical cells to be used to support all tri-Service large turbine engine development testing. ($0.325M)
   - (U) Begin study of existing test capabilities used for weather/erosion testing of radomes/seeker materials to identify areas that require optimization. ($0.100M)
   - (U) Begin design and upgrade of J-4 rocket test stand to restore nation's only continuous altitude simulation test capability to support medium thrust liquid rocket motor testing. ($1.360M)
   - (U) Initiate and complete in FY94 the Range G Flyer Plate project to upgrade Range G capability to produce higher velocity impact testing. ($0.600M)
   - (U) IOC for Improved Ballistic Range Project. ($0.500M)

3. (U) FY 1995 Planned Program:
   - (U) IOC of J-6 project. ($1.065M)
   - (U) Continue AEDC Data Acquisition and Processing System with acquisition and installation of additional work stations/processors. ($4.657M)
   - (U) IOC for T-7 control systems for TUSS project. ($0.412M)
   - (U) Continue purchase of additional CAD/CAM work stations. ($2.033M)
   - (U) IOC for increased thrust rating of the T-Cells for the ongoing Fighter Engine Test Capability upgrade. ($0.507M)
   - (U) Begin fabrication and continue upgrade of the J-4 Cryogenic Liquid Rocket Test Capability. ($1.724M)
   - (U) Continue studies of existing test capabilities used for weather erosion testing of radomes/seeker materials. ($0.101M)

4. (U) Program to Completion: This is a continuing project.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604759F
PE Title: Major T&E Investment

Project Number: 3120
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3120 Air Force Development Test Center (AFDTC)								
17,585	15,457	16,604	20,624	18,291	22,685	21,864	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The AFDTC, located at Eglin AFB, FL, conducts and supports developmental test and evaluation and operational test and evaluation of non nuclear air armaments, electronic combat systems, and target acquisition and weapon delivery systems; provides a climatic simulation capability; and determines target/test item electronic signatures. The Preflight Integration of Munitions and Electronic Systems (PRIMES) provides the instrumentation to conduct preflight checkout of total integrated weapon systems in a secure anechoic chamber. The Guided Weapon Evaluation Facility (GWEF) provides a full spectrum, multifunctional seeker/sensor laboratory test capability for all guided weapons. Seeker T&E provides ground and airborne test instrumentation support for infrared (IR), millimeter wave (MMW), and laser weapon RDT&E programs. The Armament Systems Test Environment (ASTE) Range Systems effort upgrades instrumentation of the major data collection systems supporting munitions test requirements. The Electromagnetic Test Environment (EMTE) Range Systems modernizes instrumentation which supports the Electronic Combat test process. Mission Control/Data Analysis provides for real-time central mission control and analysis. GPS Range Systems will provide a major improvement for Time-Space-Position-Information (TSPI) at all MRTFBs and specifically at the Eglin Ranges for munitions testing. These projects ensure test center technology is compatible with weapon systems to be tested such as AMRAAM, MMW MAVERICK, AGM-130, Sensor Fused Weapon, JTIDS, JSTARS, Silent Attack Warning System, etc. The Climatic Test Facility modernization of instrumentation and environmental capabilities supports the major upgrade which will extend its useful life to 2015.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) PRIMES procured instrumentation and simulation equipment capable of greater bandwidth and higher speed and began procurement of a flight environment simulator. ($2.1M)
   - (U) GWEF completed the multispectral test area interconnect and began development of an IR scene generator. ($1.6M)
   - (U) Airborne Test Instrumentation equipment procurement continued and modifications to initial aircraft began. ($3.0M)
   - (U) Seeker T&E procured weather instrumentation and began procurement of a spectral radiometer. ($3.2M)
   - (U) ASTE Range Systems continued upgrading cinetheodolites (Cine-T), microwave towers, and range telemetry (TM). ($2.0M)
   - (U) EMTE Range Systems procured the Scanning Transient Pulse Measurement System, continued EMTE instrumentation upgrades, and began equipment installation. ($2.5M)

Program Element: #0604759F
PE Title: Major T&E Investment

Project Number: 3120
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

- (U) Mission Control completed the real-time test support capability and began procurement of system for processing and displaying information in the classified mission areas. ($1.7M)
- (U) GPS Range Systems procured additional RAJPO pods, bringing Wing total to four. ($0.9M)
- (U) Additional data systems were acquired for the Climatic Test Facility along with climatic simulation equipment. ($0.5M)

2. (U) FY 1994 Planned Program:
- (U) PRIMES will complete the second phase of the GWEF/PRIMES link to provide interoperability between PRIMES and GWEF to allow the aircraft to "fly" in PRIMES and "launch" its munitions in GWEF to simulate an open air flight test. ($2.403M)
- (U) GWEF will begin procuring equipment to support the mid-course lab. Software development will begin to utilize the distribution network to support dual mode seeker testing. Continue acquisition of the IR Target Generator (IRTG). ($1.350M)
- (U) Seeker T&E will continue development of MMW radar, consolidation of IR pods, and complete procurement of a second ground/airborne IR pod. This pod provides signature measurement data capabilities to support tri-service test requirements. ($0.884M)
- (U) ASTE Range Systems will continue to provide test support with upgrades and modernization of Cine-T, range telemetry, and photo-optics. ($3.083M)
- (U) Range Data Systems will begin investments in submunition telemetry to support munitions/submunitions testing, begin planning efforts for the Eglin range fiber optics network, and continue acquisition of range instrumentation systems. ($0.807M)
- (U) Airborne Test Instrumentation will procure bench instrumentation and continue upgrades to preflight support equipment. ($1.000M)
- (U) Continue Mission Control/Data Analysis procurement of data display equipment to support two new classified mission control rooms. ($0.671M)
- (U) GPS Range Systems will begin data link acquisition and equipment integration, and initiate integrated TSPI range efforts to incorporate RAJPO equipment. ($4.679M)
- (U) Climatic Test Facility will procure equipment necessary to install three new main refrigeration units. ($0.600M)

3. (U) FY 1995 Planned Program:
- (U) PRIMES will start the third phase of the GWEF/PRIMES link, complete the RF Spectrum Monitor/Verification System and initiate efforts Reactive Loop. ($1.422M)
- (U) GWEF will complete the IR Target Generator, procure an instrument isolation pad to support the midcourse test area, start procurement of a multi-mode test capability to simultaneously control two test area scene generators and real-time simulations, and procure/install a wide band, digital RF memory to support MMW simulation. ($1.900M)
- (U) Seeker T&E will complete IR Pod Consolidation. This effort combines the capabilities of two instrumentation pods into

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PE Title: Major T&E Investment

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one, allowing it to support all test scenarios. Continue procurement of MMW instrumentation and EO/IR/Laser Support Systems. ($1.475M)

- (U) ASTE Range Systems will continue Cine-T Encoder Upgrades, Central Timing Upgrades to replace Loran C Time Code Generators (TCGs), provide 6 sites with high speed/ultra high speed video, begin replacement of 4 transportable MW antenna towers, and upgrade Range TM. ($2.914M) **(deleted Cine-T & reduced Range Photo Optics by $171K)**
- (U) Mission Control/Data Analysis will continue procurement of data display equipment for the classified mission control rooms to provide full mission capability. Begin purchase of post mission processing equipment to support SAR projects. ($1.331M)
- (U) GPS Range Systems will continue data link acquisition and equipment integration, and integrated TSPI range efforts to incorporate RAJPO equipment. ($3.573M)
- (U) Climatic Test Facility will continue upgrades to mechanical equipment not included in the major upgrade, but that are required to complete the effort and comply with environmental regulations. Mechanical equipment being refurbished or replaced ranges in age from 20 - 48 years old. ($0.704M)
- (U) Common Airborne Instrumentation System (CAIS) will continue procurement and installation of Standard Aircraft Instrumentation kits to promote compatibility and range interoperability, and shorten test preparation time. Will continue acquisition of support equipment to upgrade ground stations, purchase portable TM units, and update CAD systems. ($2.523M)
- (U) Range Data Systems will continue investments in Subminiature Telemetry. Continue acquisition of Range Instrumentation Systems to replace obsolete data acquisition systems. ($0.762M)

4. (U) Program to Completion: This is a continuing project.

D. (U) WORKED PERFORMED BY: Cross Systems, Atlanta, GA (GWEF); TRW, Warner Robins, GA (PRIMES); GEC Avionics Ltd, London, England; and Southern Research Technology, Birmingham, AL (Seeker T&E).

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) Technical Changes: Not Applicable.
2. (U) Schedule Changes: Not Applicable.
3. (U) Cost Changes: Not Applicable.

F. (U) PROGRAM DOCUMENTATION: PMD 2164(6)/0604755F Improved Capability for DT&E.

G. (U) RELATED ACTIVITIES:
(U) PE 0604940D, Test Instrumentation Development.

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(U) PE 0604735F, Combat Training Ranges.
(U) PE 0604256F, Threat Simulator Development.
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATIONS:

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation: 3300, Budget Activity: Defense-Wide Mission Support, Program Title: McKinley Lab Upgrade								
5,000	37,000	20,000					N/A	62,000

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable.

J. (U) MILESTONE SCHEDULE: This is a continuing project.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604759F
PE Title: Major T&E Investment

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Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
3620 Air Force Flight Test Center (AFFTC)								
13,855	21,658	25,427	31,595	31,166	30,534	31,128	Cont	TBD

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: The AFFTC, located at Edwards AFB, conducts and supports developmental test and evaluation and operational test and evaluation of aircraft and aircraft systems, aerospace research vehicles, unmanned miniature vehicles, cruise missiles, parachutes delivery/recovery systems, and cargo handling systems. Reentry support and engineering evaluation is provided to the Space Shuttle program. Supports space vehicle tracking and provides airborne telemetry support for the AF, other DoD agencies and NASA. AFFTC operates the Air Force Test Pilot School (TPS). The Avionics Test and Integration Complex (ATIC) will allow ground testing of advanced aircraft integrated network, including all flight control features as well as avionics. The AF CAIS Integration & Support (CAIS I&S) project is a joint effort by the AFDTC and AFFTC, and supports DoD objectives for interoperability /commonalty. The goal of CAIS I&S is the integration of CAIS equipment and supporting instrumentation equipment and systems to provide a full airborne instrumentation operational capability. The Test Instrumentation Management System (TIMS) will be completed under this project. Advanced Airborne Test Instrumentation System (AATIS) fills the gap between older airborne data acquisitions systems (such as ATIS and PDAS) and the "common" data acquisition system of the future (CAIS). TIMS is the Air Force ground support system for ATIS, AATIS, and CAIS. The Test Instrumentation project will upgrade our current diagnostic and calibration capability to support installed instrumentation suites during the CAIS phase-in period and beyond. The Airborne Sensor Upgrade will integrate centimeter-accuracy Global Positioning System (GPS) into airborne platforms using commercial GPS technologies. The Computer Aided Engineering and Manufacturing (CAE/CAM) upgrade provides AFFTC with computer resources required to execute Class II aircraft modifications. The Advanced Data Acquisition and Processing Systems (ADAPS) project provides an integrated capability to satisfy real-time first generation post-test data processing, archival, and display requirements through the 1990's. The developmental approach is directed towards providing a high degree of interoperability between systems and components by adherence to Air Force and DoD guidelines. The technologies being developed under ADAPS have the potential to satisfy data processing and display needs at various multi-service test ranges. The Scientific and Computer Acquisition Project (SECAP) is an extension of the ADAPS project to provide a decentralized and interactive post-test data analysis capability. The Automated Test Data Management System (ATDMS) provides an automated capability to manage the vast amount of test information required to plan and conduct a test. The AF GPS TSPI-RAJPO Equipment project provides funding for the purchase of production GPS equipment developed by the RAJPO (OSD funded) for tri-service application. The Ground TSPI upgrades project provides for procurement of video readers, upgrades to the Master Timing Station, and strategic assessment studies of real-time trajectory generation at remote cinetheodolite locations. The Advanced Range Data Systems (ARDS) project is a highly accurate TSPI data and communications system which takes advantage of the Global Positioning System (GPS). The Local Range Network (LRN) project provides secure data communications for AFFTC networking. The Digital Switch project upgrades voice communication, replacing an obsolete air-to-ground

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and ground-to-ground mission communication system. The Avionics Test Bay Systems (ATBS) upgrade project develops generic hardware-in-the-loop spread bench capabilities to ground test and evaluate integrated advanced avionics systems. The Test and Evaluation Mission Simulator (TEMS) upgrade will equip simulators with advanced computers and visual systems to satisfy latest aircraft technology simulation requirements. The Space Based Data Relay (SBDR) project will allow the ARIA to fulfill customer needs for real-time, high speed data, and greatly improve the overall range data relay capability. The ARIA Extended S-Band Telemetry upgrade will ensure the compatibility of the ARIA with the Expendable Launch Vehicles (ELV) and major DoD ranges. The Advanced Radar Testbed (ARTB) provides a means to perform inflight radar experiments, demonstrations, and tests of ECCM hardware and techniques.

C. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1993 Program:
   - (U) Continued Range Upgrade (Digital Switch) with installation of equipment, and begin acceptance testing and checkout in control rooms. ($2.5M)
   - (U) FOC of ARDS central processor. Began limited use of RAJPO developed GPS equipment. Missions supported include: F-15, F-16, B1 and others. Completed Advanced Tracker System prototype testing and awarded production contract. ($2.3M)
   - (U) Continued Edwards Local Range Network development with further expansion of base fiber network to interconnect 14 test activities. IOC of 10MB/s capability. $0.7M)
   - (U) Obtained Milestone I approval for ADAPS program. IOC of ADAPS Mission Display prototype in the Mission Control Center. Awarded Telemetry PreProcessor and Workstation requirements contracts. Published ADAPS System Segment Specification and Operational Requirements document. ($2.7M)
   - (U) Obtained Milestone 0 approval for ATDMS. Completed Mission Planning prototype for the C-17, and supported C-17 avionics flight test missions using the prototype. Published the ATDMS Concept Document and Development Plan. Commenced work on an automated setup prototype. ($0.5M)
   - (U) Completed prototype of a workstation-based data analysis system under the SECAP project and published the prototype system design report. ($0.2M)
   - (U) Continued TEMS training and installation. ($0.4M)
   - (U) FOC of AATIS upgrade project. Released version 2.1 of the TIMS software with full support for ATIS and initial support for AATIS equipment on both laboratory and flight-line systems. ($2.0M)
   - (U) Procured CAE/CAM hardware and software for mechanical design, drafting, and printed circuit board design and fabrication to support Class II aircraft modifications for flight test. ($0.3M)
   - (U) Continued ATBS equipment and software upgrade. ($0.4M)
   - (U) Funded an equipment compatibility study for the National Air Space Plan to make AF test ranges compatible with new FAA equipment. ($0.2M)

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- (U) Procured hardware and software for integration of the Integrated Development Facility (IDF) at AFFTC in support of the 4950TW mission transfer to the AFFTC. ($1.2M)

2. (U) FY 1994 Planned Program:
   - (U) Continue Range Upgrade (Digital Switch) acceptance testing leading to system IOC in FY96. Begin removal of old switching equipment. Permits voice interoperability and allows secure transfer of TSPI data among all the major test ranges which are slated to purchase same equipment. ($0.385M)
   - (U) Commence GPS RAJPO production equipment procurement (contract award 2nd quarter). Conduct operational testing and integration for first GPS RAJPO production units. All three services will be purchasing this TSPI system. ($3.831M)
   - (U) Complete integration and checkout of the Advanced Tracker System leading to a 4th quarter IOC, and begin procurement of a video reader for TSPI analysis. ($0.734M)
   - (U) Continue Edwards Local Range Network development. Begin development of a network operations center, expand the fiber optic hub, and further expand the base fiber network to interconnect additional test activities. Will use commercial off-the-shelf equipment, standard data rates, interfaces, and formats which support data transfers to other T&E bases. ($0.705M)
   - (U) Continue development of an ADAPS real-time/post flight processing (RT/PTP) capability. This will provide a high rate, high throughput, graphical display capability to support the initial real-time requirements of the F-22 and other AFFTC test programs. The following are planned accomplishments for FY94: System Requirements Review, System Design Review, Preliminary Review, Milestone II approval, and Critical Design Review. ($5.400M)
   - (U) ATDMS final development and testing of an automated set-up prototype for the ADAPS systems. ATDMS will provide an automated way of setting up ADAPS, and also track, with a data base, all setup information. It will also integrate test planning together with automated setup. The following are planned accomplishments for FY94: Milestone I approval, System Requirements Review, and Milestone II approval. ($1.319M)
   - (U) Continue TEMS training and installation, leading to IOC in Dec of 94. Equipment will be interoperable with other T&E simulators throughout the DoD. ($0.500M)
   - (U) Procure hardware and software under CAE/CAM to provide an electronics design and analysis capability, and integrate and document the various software packages. Planned IOC of mechanical design and printed circuit board design/fabrication. ($.952M)
   - (U) Begin procurement of calibration and diagnostic equipment required to support CAIS under the Test Instrumentation project. This project will provide supportability and commonality of fielded test instrumentation systems in current and future CTF programs. ($0.154M)
   - (U) Continue CAIS I&S development by integrating the initial CAIS data acquisition units with TIMS (This system has been endorsed by the CAIS-JPO). IOC of TIMS for initial CAIS support is planned for fourth quarter of FY94. Complete development of a transportable (box) version of TIMS. Begin setting up a logistics support structure,and procurement of quick reaction kits. ($2.510M)

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PE Title: Major T&E Investment

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- (U) Begin ATBS hardware installation and continue software upgrade. Complete jamming capability upgrade. Install fiber optics interfaces. Complete VAX computer equipment upgrade. Project is compatible with existing Integration Facility for Avionics System Testing (IFAST) and DoD directed Electronic Combat Integration Test facility (ECIT) program. ($0.400M)
- (U) Upgrade Utah Test and Training Range (UTTR) TSPI and Instrumentation. ($0.200M)
- (U) Award contracts for the ARIA Space Based Data Relay System program and begin engineering/design efforts. ($4.000M)
- (U) Award contract for antenna feeds for the ARIA Extended S-band program engineering design efforts. Begin procurement of replacement receivers and bandpass filters. ($0.485M)
- (U) Procure and install telemetry, data recording, and computer equipment for the Advanced Radar Testbed (ARTB). ($0.083M)

3. (U) FY 1995 Planned Program:

- (U) Continue Range Upgrade (Digital Switch) with completion of acceptance testing and removal of the old switch. Begin final documentation of system software. ($0.300M)
- (U) Continue procurement of RAJPO GPS equipment. ($5.547M)
- (U) Final installation and integration of video TSPI readers. Begin initial engineering and system design for the Ground TSPI upgrade to implement a base-wide GPS timing standard. ($0.500M)
- (U) Continue Edwards Local Range Network development with further expansion of base fiber optic backbone. Begin development of the ATM Network and the Network Operations Center. ($1.310M)
- (U) Finish the development, installation, and IOC of the first ADAPS RT/PTP system. This system is critical for supporting the real-time requirements of the F-22. Begin development of a mass storage and data base capability. This system will eventually replace the 65,000 nine-track tapes currently being stored at the AFFTC. The following are planned accomplishments for FY95: ADAPS system installation, Test Readiness Review, and IOC of first system. ($5.161M)
- (U) Under the ATDMS project, complete development of the first automated data setup in support of the ADAPS RT/PTP system. Provide an interface to the TIMS. The following are planned accomplishments for FY95: Preliminary Design Review, Critical Design Review, and IOC of first system for data setup. ($1.500M)
- (U) Begin the initial design and development of the SECAP system that builds on the work accomplished in FY93. Commence initial acquisition planning and hardware specification development. The SECAP program is intended to replace the current CYBER system with a distributed, workstation based computing environment that can be located either centrally or decentrally. The following are planned accomplishments for FY95; Publish Operational Requirements Document, Milestone I approval, System Requirements Review. ($0.300M)
- (U) Continue equipment purchases under the Test Instrumentation project to upgrade existing instrumentation design, operation, and precision measurement capabilities. ($0.300M)
- (U) Continue CAIS I&S development. Release version 3.0 of the TIMS software to support CAIS. Develop a version of

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TIMS for flight line use. Award requirements contract for data recorder, and continue procurement of quick reaction kits. ($4.326M)

- (U) Continue procurement of CAE/CAM electronic design, analysis, and documentation and manufacturing capabilities. Planned IOC of electronic design and analysis. ($0.704M)
- (U) Continue work on final procurement specification and software enhancements for the ATBS upgrade. Prepare site for final installation. ($.600M)
- (U) Begin equipment purchase and Class II Mod Design for the ARIA Space Based Data Relay System program. Commence equipment installation and modification of first aircraft. ($3.029M)
- (U) Continue the ARIA Extended S-Band program with purchase of equipment and modification first aircraft. ($1.200M)
- (U) The ARIA Record/Timing program continues with installation of replacement recording and timing equipment. ($0.113M)
- (U) Procure and install telemetry, data recording, and computer equipment for the Advanced Radar Testbed (ARTB). ($0.337M)

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

D. (U) WORK PERFORMED BY: Computer Science Corporation, Lompoc, CA; Ball Systems Engineering Services, San Diego, CA (Advanced Range Data System); Science Applications International Corporation; Los Angeles, CA; Data General Corp; Irvine, CA; and AFFTC in-house resources.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

1. (U) Technical Changes: Not applicable.
2. (U) Schedule Changes: Not applicable.
3. (U) Cost Changes: Not applicable.

F. (U) PROGRAM DOCUMENTATION: PMD 2164(6)/0604755F, Improved Capability for DT&E.

G. (U) RELATED ACTIVITIES:

(U) PE 0604940D, Test Instrumentation Development.
(U) PE 0604256F, Threat Simulator Development.
(U) PE 0604735F, Combat Training Ranges
(U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

H. (U) OTHER APPROPRIATIONS: Not applicable.

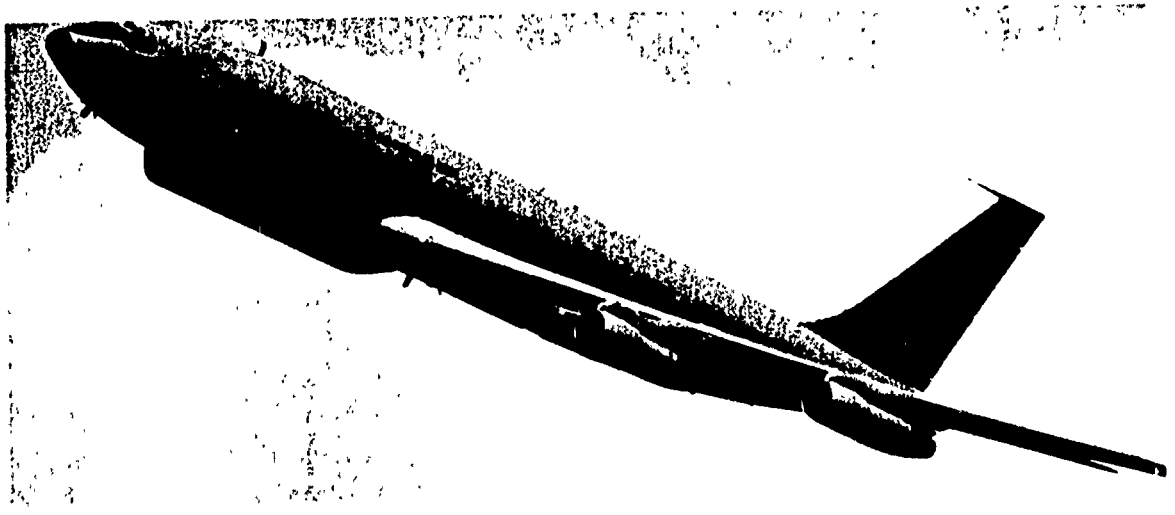
I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: Not applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0604770F
PE Title: Joint STARS

Project Number: N/A
Date: February 1994
Budget Activity : 5 - Engineering and Management Development
Old Budget Activity: 4 - Tactical Programs

Project Title: N/A



POPULAR NAME: Joint STARS

Program Element: 0604770F
PE Title: Joint STARS

Project Number: N/A
Budget Activity : 5 - Engineering and Management Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

A. (U) **SCHEDULE/BUDGET INFORMATION ($ in Thousands):**

SCHEDULE	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	To Complete
Program Milestones	DAB Review - LRIP, May 93			MS III 2Q FY96	IOC 2Q FY97			FOC FY04
Engineering Milestones	Fol-On EMD CDR 2Q FY93	Gnd Spt Systs CDR 4QFY94	E-8C Dev Complete	Tadil-J CDR 2QFY96	Constant Source CDR	Constant Source Dev		
T&E Milestones	SLPV Complete	E-8A Test & Integ. Comp	MOT&E Start 3QFY95	DT/MOT&E Complete	SDS Test Integ Comp	Constant Source Testing		
Contract Milestones	1st Prod Contract Awd	2nd Prod Contract Awd	Constant Source Awd					
BUDGET ($000)	**FY 1993**	**FY 1994**	**FY 1995**	**FY 1996**	**FY 1997**	**FY 1998**	**FY 1999**	**Budget Total (To Complete)**
Major Contract	224,700	180,390	111,260	114,990	145,200	141,400	33,000	1,125,340 (319,600)
Support Contract	26,863	22,501	28,888	27,423	26,207	25,915	8,432	226,629 (60,400)
In-House Contract	4,100	3,840	3,950	3.980	6,000	5,900	1,300	42,270 (13,200)
GFE/Other	57,800	76,340	46,310	24,180	24,000	22,600	5,500	308,830 (52,100)
Total	313,463	283,071	190,408	170,573	201,407	195,815	48,232	1,703,069 (445,300)

Program Element: 0604770F
PE Title: Joint STARS

Project Number: N/A
Budget Activity : 5 - Engineering and Management Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

B. (U) BRIEF DESCRIPTION OF MISSION REQUIREMENT AND SYSTEM CAPABILITIES: There is an Air Force and Army need to provide, from airborne platforms, near-real-time surveillance and targeting information on moving and stationary ground targets (growth to maritime operations), slow moving rotary and fixed-wing aircraft, and rotating antennas. This information would enable operational and tactical commanders to make and execute battle decisions. To meet these needs, the Air Force and Army initiated the Joint Surveillance Target Attack Radar System (Joint STARS) program with the Air Force as lead service. Joint STARS will be capable of wide area surveillance, detection, location, classification, tracking, and monitoring of moving targets. The system will also be capable of providing target information for pairing direct attack aircraft and standoff weapons against selected targets. The system will be capable of being cued by other reconnaissance, surveillance, and target acquisition systems; able to respond rapidly to worldwide contingencies; and provide surveillance and attack information in all light and near-all-weather conditions. The operational utility of the system was effectively demonstrated by the outstanding performance of the two developmental aircraft in support of combat operations during Desert Storm. The program is in Engineering and Manufacturing Development, Budget Activity 5, Research Category 6.5.

C. (U) PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1993 Program:
   - (U) - Continue E-8A integration and test ($40.00M)
   - (U) - Continue E-8C follow-on development ($173.00M)
   - (U) - Start Ground Support Systems (GSS) development ($7.00M)
   - (U) - Continue Self Defense Suite (SDS) development ($23.00M)
   - (U) - Continue Government Furnished Equipment (GFE), program support, test, and other miscellaneous efforts ($51.10M)

2. (U) FY 1994 Planned Program:
   - (U) - Complete residual test activities and award fees on E-8A development ($4.8M)
   - (U) - Continue E-8C follow-on development and start testing program ($108.37M)
   - (U) - Continue GSS development ($38.36M)
   - (U) - Continue SDS development ($23.02M)
   - (U) - Start maintenance trainers development ($19.18M)

Program Element: 0604770F
PE Title: Joint STARS

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(U) - Continue GFE, program support, test, and other miscellaneous efforts ($89.38M)

3. (U) FY 1995 Planned Program:
   (U) - Continue E-8C follow-on development and testing program ($28.37M)
   (U) - Continue GSS development ($28.37M)
   (U) - Continue SDS development ($37.49M)
   (U) - Continue maintenance trainers development ($16.21M)
   (U) - Continue GFE, program support, test, and other miscellaneous efforts ($79.95M)

4. (U) Program to Completion:
   (U) - Complete E-8C follow-on residual tasks and award fees ($21.48M)
   (U) - Complete GSS development ($208.96M)
   (U) - Complete SDS development ($59.45M)
   (U) - Accomplish multi-stage product improvement ($102.17M)
   (U) - Continue GFE, program support, test, and other miscellaneous efforts ($223.86M)

D. (U) WORK PERFORMED BY: The major contractor is Grumman Melbourne Systems Division, Melbourne FL. The radar sets are manufactured by Norden Systems, Norwalk CT. The Joint Program Office is located at Electronics Systems Center, Hanscom AFB MA.

E. (U) COMPARISON WITH FY 1994 DESCRIPTIVE SUMMARY:

NARRATIVE DESCRIPTION OF CHANGES

1. (U) TECHNICAL CHANGES: None

Program Element: 0604770F
PE Title: Joint STARS

Project Number: N/A
Budget Activity : 5 - Engineering and Management Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

2. (U) SCHEDULE CHANGES: Delay and reductions in the SDS program content occurred. Constant Source was delayed one year and TADIL-A was deleted. The Software Support Facility delivery changed from Mar 95 to May 96. The DAB Milestone III (Full Rate Production) changed from 4Q FY94 to 2Q FY96.

3. (U) COST CHANGES: The program RDT&E funding increased $76.6M in the BES.

EXPLANATION:

1. (U) Technical: None

2. (U) Schedule: Delay and reductions in the SDS program content occurred due to reductions in funding. The Software Support Facility delivery changed due to program restructuring and rephasing resulting from the FY94 Amended President's Budget. The DAB Milestone III (Full Rate Production) changed in order to accommodate the Multi-Service Operational Test & Evaluation (MOT&E) test schedule, the availability of assets for these joint tests, and reduce program development risk.

3. (U) Cost: The program funding changed as a consequence of undergoing a detailed bottom-up re-estimate of requirements, by appropriation, in preparation for the May 93 Defense Acquisition Board (DAB) Review for Low Rate Initial Production (LRIP). The current funding and production profile is the result of these detailed reviews by the Air Force and OSD Cost Analysis Improvement Group (CAIG). Additional funding was added in FY 1995 to reduce program development risk.

F. (U) PROGRAM DOCUMENTATION:

- (U) TAF SON 309-82 (S) Jun 82
- (U) USAF/USA MOU (C) Apr 85
- (U) OUE I (S) Feb 88
- (U) ADM (DABIIB) (U) Jul 88
- (U) ADM (DAB Review) (U) Oct 89
- (U) JROC-065-90 (U) Sep 90
- (U) JSORD (S) Apr 93

Program Element: 0604770F
PE Title: Joint STARS
Project Number: N/A
Date: February 1994
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Old Budget Activity: 4 - Tactical Programs

- (U) ADM (DAB LRIP) (U) May 93
- (U) PMD 6027 (23) (U) Jun 93
- (U) TEMP (S) Aug 93

G. (U) RELATED ACTIVITIES:

- (U) The Army Joint STARS Ground Station Module (GSM) program is funded under the Army Joint STARS Program (PE 0604770A).

- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

H. (U) OTHER APPROPRIATION FUNDS ($ in Thousands):

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Appropriation Aircraft Procurement, Budget Activity 4, Program Title Joint STARS (PE 0207581F)								
607,772	563,672	597,781	570,565	606,391	585,060	568,262	986,900	3,948,843
Quantity								
2	2	2	2	2	2	2	6*	19
*Includes the conversion of 2 E-8A aircraft to E-8C								
Appropriation Military Construction, Program Title Joint STARS (PE 0604770F)								
10,800	24,400	14,300	6,870	45,900	24,280	0	0	126,550

Program Element: 0604770F
PE Title: Joint STARS

Project Number: N/A
Budget Activity : 5 - Engineering and Management Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

I. (U) INTERNATIONAL COOPERATIVE AGREEMENTS: None.

J. (U) TEST AND EVALUATION DATA:

T&E ACTIVITY (PAST 36 MONTHS)

Event	Date	Results
Desert Storm	Jan-Mar 91	Successful wartime deployment of developmental system
Government System Level Performance Evaluation	Sep 91	Advance buy exit criteria successfully evaluated
System Level Performance Verification (SLPV) Start	Oct 91	Supported DAB review for LRIP and Aircraft 1 and 2 contract closeout
Medium GSM Technical Tests	May-Dec 92	Evaluated Med GSM performance in preparation for limited user tests
E-8 LRIP Operational Assessment	Jul 92 - Mar 93	Operational evaluation of aircraft for LRIP review
Limited User Tests	Jan-Feb 93	Medium GSM successfully evaluated in support of GSM Block I LRIP DAB review
DAB Critical SLPV Completion	Feb 93	LRIP exit criteria and user-critical JSORD requirements evaluated
Contractor/Gov't SLPV Completion	Nov 93	For contract acceptance of Aircraft 1 and 2

Program Element: 0604770F
PE Title: Joint STARS

Project Number: N/A
Budget Activity : 5 - Engineering and Management Development
Old Budget Activity: 4 - Tactical Programs

Date: February 1994

T&E ACTIVITY (TO COMPLETION)

Event	Date	Result
Airworthiness	Jan-Jun 94	For E-8C technical orders data
SDS Flare Tests	Jul-Sep 94	Evaluate backup flare dispersal capability
E-8C Contractor/ Government DT&E	Apr 94 - Apr 95	Evaluate E-8C system changes
MOT&E	Apr-Dec 95	Dedicated Multi-Service Operational Tests to support Milestone III

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0604779F **Date:** February 1994
PE Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Project # none, Joint Interoperability of Tactical Command and Control (JINTACCS)								
6,670	4,729	2,063	6,389	6,293	6,412	6,559	Continuing	Continuing

B. (U) BRIEF DESCRIPTION OF ELEMENT: JINTACCS is a Budget Activity 5, Engineering and Manufacturing Development effort designed to improve the interoperability of Tactical Command & Control (C2) Systems used in support of joint operations. JINTACCS supports Air Force participation with the Army, Navy and Marines, and the Joint Interoperability and Engineering Organization (JIEO) which acts as the Executive Agent. Service and agency activities are governed by Joint Chiefs of Staff (JCS) approved documentation including Technical Interface Concepts and Technical Interface Design Plans. Close liaison across each of the Service JINTACCS programs precludes duplication of efforts. Elements of the Tactical Air Control System, E-3 Airborne Warning and Control System (AWACS), and Joint Tactical Information Distribution System (JTIDS) participate in this program. The JINTACCS program, formerly Ground and Amphibious Military Operation (GAMO) is directed by JCS Memorandum 205-72 dated 1 April 1971, as modified by a Secretary of Defense memorandum, "Reorganization of the DoD Program to Achieve Interoperability of Tactical C2 Systems for GAMO," dated 2 Aug 1977. The program complies with requirements of DoD Directive 4630.5, "Compatibility, Interoperability, and Integration of Command, Control, Communications, and Intelligence (C3I) Systems," November 12, 1992 and DoD Instruction 4630.8, "Procedures for Compatibility, Interoperability, and Integration of C3I Systems," November 18, 1992.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) Project Number "None" and Title: The Joint Interoperability of Tactical Command and Control Systems (JINTACCS) program entails development, testing, implementation and configuration management of Message Text Formats (MTF) and

Program Element: #0604779F **Date:** February 1994
PE Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

data link standards; and support of maintenance and testing of MTF and data link operational standards. This project supports the efforts to ensure C3 systems' interoperability among all the CINCs, DoD agencies, and the services.

(U) FY 1993 Accomplishments:

- (U) - Began integration of Airborne Battlefield Command and Control Center (ABCCC) and Joint Surveillance/Target Attack Radar System (JSTARS) Operational Facility (OPFAC) into testbed. ($1.750K)
- (U) - Began development of automated test analysis system. ($450K)
- (U) - Began modification of message standards supporting Theater Missile Defense (TMD). ($250K)
- (U) - Began development of Digital Message Transfer Device (DMTD) and Variable Message Format (VMF) standards. ($500K)
- (U) - Began technology exchange/integration with Joint Staff J6 Joint Universal Data Interpreter (JUDI) project. ($450)
- (U) - Continued development of Tactical Digital Information Link-J (TADIL-J) capability ($300K)
- (U) - Continued network design and aids development, and training for JTIDS network design facility and architecture. ($550K)
- (U) - Continued advanced MTF processing software development. (500K)
- (U) - Continued expansion of MTF certification testing to fielded systems. ($400K)
- (U) - Continued integration of Modular Control Equipment (MCE) OPFAC into test facilities. ($1.000K)
- (U) - Completed integration of MTF parser into Wing Command and Control System (WCCS) and Contingency Tactical Automated Planning System (CTAPS). ($520K)

(U) FY 1994 Plans:

- (U) - Begin Air Force testing of the TADIL-J message standard. ($200K)
- (U) - Begin acquisition of JSTARS and Iceland Air Defense System (IADS) Test Equipment. ($900K)
- (U) - Begin Combat Air Forces (CAF) preliminary testing of TADIL-J in ABCCC and AWACS. ($43K)
- (U) - Begin review of impact of emerging DOD data element standardization on United States MTF (USMTF) standard. ($150K)
- (U) - Begin feasibility analysis of ADA 9X for use in object-oriented prototype development. ($150K)
- (U) - Continue development of automated test analysis system. ($300K)
- (U) - Continue modification of message standards supporting TMD. ($200K)

Program Element: #0604779F **Date:** February 1994
PE Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

(U) - Continue development of DMTD and VMF standards. ($400K)
(U) - Continue technology exchange/integration with Joint Staff J6 JUDI project. ($250K)
(U) - Continue development of TADIL-J capability. ($200K)
(U) - Continue network design and aids development, and training for JTIDS network design facility and architecture. ($450K)
(U) - Continue advanced MTF processing software development. ($300K)
(U) - Continue expansion of MTF certification testing to fielded systems. ($300K)
(U) - Continue integration of JSTARS and MCE OPFAC into test facilities. ($836K)
(U) - Complete integration of ABCCC OPFAC into test facility. ($50K)

(U) FY 1995 Plans:
(U) - Continue Air Force testing of the TADIL-J message standard. ($63K)
(U) - Continue CAF preliminary testing of TADIL-J in ABCCC and E-3. ($100K)
(U) - Continue review of impact of emerging DOD data element standardization on USMTF standard. ($100K)
(U) - Continue feasibility analysis of ADA 9X for use in object-oriented prototype development. ($50K)
(U) - Continue modification of message standards supporting TMD. ($150K)
(U) - Continue development of DMTD and VMF standards. ($200K)
(U) - Continue technology exchange/integration with Joint Staff J6 JUDI project. ($200K)
(U) - Continue development of TADIL-J capability. ($100K)
(U) - Continue network design and aids development, and training for JTIDS network design facility and architecture. ($200K)
(U) - Continue advanced MTF processing software development. ($175K)
(U) - Continue expansion of MTF certification testing to fielded systems. ($175K)
(U) - Continue integration of MCE OPFAC into test facilities. ($200K)
(U) - Continue development of automated test analysis system. ($200K)
(U) - Complete acquisition of JSTARS and IADS test equipment. ($100K)
(U) - Complete integration of JSTARS OPFAC into test facility. ($50K)

Program Element: #0604779F **Date:** February 1994
PE Title: Joint Interoperability of Tactical Command and Control Systems (JINTACCS)
Budget Activity : #5 - Engineering and Manufacturing Development
Old Budget Activity : #4 - Tactical Programs

(U) Work Performed By: The Air Combat Command/Battle Management and Interoperability Division (HQ ACC/DRI), Langley AFB VA, has the coordinating and implementing authority. Management responsibility for RDT&E funding is assigned to the Air Force Material Command (AFMC) Wright-Patterson AFB OH. Operational support involves the Air Force Participating Test Unit (AFPTU) within the 1912 Computer Systems Group (CSGP) at Langley AFB VA, for compatibility and and interoperability testing and demonstrations. The JINTACCS contractors are the COMPTEK Research, Inc., Buffalo NY; HTI, Fairfax VA; and the MITRE Corporation, Bedford MA.

(U) Related Activities:
- (U) - PE 0604780M, Joint Interoperability for Tactical Command Control Systems; PE 0604779N, JINTACCS Program; PE 0604779A, JINTACCS Program; PE 0208045D, C3 Interoperability/Joint Tactical C3 Agency; and PE 0208298D, Management Headquarters.
- (U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0605101F
PE Title: RAND Project AIR FORCE
New Budget Activity: #6 - RDT&E Management & Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 19[illegible]

A. (U) RESOURCES ($ In Thousands)

FY 93 Actual	FY 94 Estimate	FY 95 Estimate	FY 96 Estimate	FY 97 Estimate	FY 98 Estimate	FY 99 Estimate	To Complete	Total Program
1110 RAND Project AIR FORCE								
22,750	24,000	28,039	26,154	26,704	27,945	29,339	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: Program funds RAND Project AIR FORCE (PAF), the only Air Force Federally Funded Research and Development Center for Studies and Analyses. It provides for continuing analytical research across a broad spectrum of aerospace issues and concerns. The PAF research agenda is focused primarily on mid- to long-term problems; in addition, PAF provides quick response assistance for senior Air Force officials on high priority, near-term issues. Results and analytical findings directly impact senior management deliberations on major issues. The Air Force Advisory Group (AFAG), chaired by the Vice Chief of Staff, reviews, monitors, and approves PAF research efforts. Each project is initiated, processed, and approved IAW AFR 20-9 that requires General Officer (or SES equivalent) sponsorship and involvement on a continuing basis.

C. (U) JUSTIFICATION FOR PROJECTS GREATER THAN $10 MILLION IN FY 1995:

(U) FY 1993 Accomplishments:

(U) - Principal research efforts included studies on: future Air Force roles and missions; regional scenarios and strategies; improving bomber force flexibility; creating effective air campaigns; attacking critical targets; dynamic battlefield management; lean logistics; and, acquisition reform.

(U) - Quick response studies included: F-15E vs. F-16 comparison; consolidation of military logistics; AIM-9X COEA; F-22 OT&E; Milstar options; and, the role of the air reserve in peacetime mobility operations.

Program Element: #0605101F **Date:** February 1994
PE Title: RAND Project AIR FORCE
New Budget Activity: #6 - RDT&E Management & Support
Old Budget Activity: #6 - Defense-Wide Mission Support

(U) FY 1994 Plans:

(U) - Research will continue on long-term projects initiated during FY 1993 and earlier.

(U) - The FY 1994 program includes research on: the psychological impact of airpower; power projection against nuclear-armed opponents; adversary options to counter U.S. aerospace power; non-standard scenarios; planning the future force; future aircraft technologies; airpower operations in joint theater campaigns; intelligence support and mission planning; lean logistics; and, acquisition program management.

(U) - PAF research is organized into the following seven projects. These seven projects are aimed at ensuring the Air Force can project aerospace power across the entire spectrum of conflict in an era of declining budgets, personnel, and force structure.

FY 1994 Projects	($ in Millions)
Strategy and Doctrine	3.2
Force Structure	3.8
Aero Systems Modernization	3.8
Force Employment	3.0
C3I/Space	3.7
Logistics	3.5
Acquisition	3.0
Total	24.0

(U) FY 1995 Plans:

(U) - Research will continue on long-term projects initiated during FY 1994 and earlier.

(U) - A special emphasis project planned for FY 1995 will be the application of modern business practices to Air Force program management and logistic support.

(U) - New topics will evolve from the major issues established by the AFAG where PAF has developed special expertise and can continue to make unique contributions to the Air Force.

Program Element: #0605101F
PE Title: RAND Project AIR FORCE
New Budget Activity: #6 - RDT&E Management & Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) - PAF research continues to be organized in the following seven projects:

FY 1995 Projects	($ in Millions)
Strategy and Doctrine	3.8
Force Structure	4.3
Aero Systems Modernization	4.2
Force Employment	3.6
C3I/Space	4.2
Logistics	4.1
Acquisition	3.8
Total	28.0

(U) FY 1996 Plans:

(U) - Research will continue on long-term projects initiated during FY 1995 and earlier.

(U) - New topics will evolve from the major issues established by the AFAG where PAF has developed special expertise and can continue to make unique contributions to the Air Force.

(U) - PAF research continues to be organized in the following seven projects:

FY 1996 Projects	($ in Millions)
Strategy and Doctrine	3.5
Force Structure	4.0
Aero Systems Modernization	4.0
Force Employment	3.3
C3I/Space	4.0
Logistics	3.9
Acquisition	3.4
Total	26.1

Program Element: #0605101F **Date:** February 1994
PE Title: RAND Project AIR FORCE
New Budget Activity: #6 - RDT&E Management & Support
Old Budget Activity: #6 - Defense-Wide Mission Support

(U) Work Performed By: The RAND Corporation, Santa Monica, CA.

(U) Related Activities:
- (U) - PAF efforts span functional and organizational boundaries. As a result, the research conducted relates to a wide spectrum of Air Force activities.
- (U) - The results are deposited with the Defense Technical Information Center for appropriate dissemination to other qualified recipients.
- (U) - To assure unnecessary duplication, each newly proposed research effort is reviewed by the Air Force Studies and Analysis Agency.
- (U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Date: February 1994

Program Element: #0605306F
PE Title: Ranch Hand II Epidemiology Study
Budget Activity: #6, RDT&E Management Support
Old Budget Activity: #6, Defensewide Mission Support

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

Project Number & Title	FY 1993 Actual	FY 1994 Estimate	FY 1995 Estimate	FY 1996 Estimate	FY 1997 Estimate	FY 1998 Estimate	FY 1999 Estimate	To Complete	Total Program
2767 Ranch Hand II Epidemiology Study									
	8,925	3,686	3,160	3,239	9,842	10,219	4,882	Cont	TBD
Total	8,925	3,686	3,160	3,239	9,842	10,219	4,882	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program was directed in 1980 by the Assistant to the President of the United States for Domestic Affairs and Policy upon the recommendation of the Interagency Working Group on the Possible Long-Term Effects of Phenoxy Herbicides and Contaminants. As a result of this Presidential direction, PE 0605306F was established to conduct a 20-year epidemiology investigation of approximately 1200 Air Force personnel who were involved with aerial spraying of herbicides in Vietnam from 1962 to 1971 (Operation Ranch Hand). The objective of this investigation is to determine whether long-term health effects exist and can be attributed to occupational exposure to phenoxy herbicides and their associated dioxins. Dioxin is an unwanted by-product from manufacturing Herbicide Orange.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

1. (U) Project 2767, Ranch Hand II Epidemiology Study: This project involves a 20-year study that compares United States Air Force (USAF) Ranch Hand personnel to other USAF crew members and support personnel who were not exposed to herbicides while serving in Vietnam. Approximately 2,200 individuals (exposed personnel group plus control group) are participating in the study. Analyses of yearly mortality rates and the past and present health status of the study population were begun in 1982 with follow-up health examination schedules at the 3-, 5-, 10-, 15-, and 20-year time periods. The study includes examination of the possible occurrence of birth defects in children as determined from children's medical records and family medical histories.

(U) FY 1993 Accomplishments:
- (U) Completed Year-10 physical exams and questionnaires. ($7,083K)
- (U) Verified examination questionnaire database. ($673K)
- (U) Conducted serum dioxin assays. ($450K)
- (U) Completed medical records coding. ($390K)
- (U) Conducted mortality and revised birth defects analyses. ($329K)

Date: February 1994

Program Element: #0605306F
PE Title: Ranch Hand II Epidemiology Study
Budget Activity: #6, RDT&E Management Support
Old Budget Activity: #6, Defensewide Mission Support

(U) FY 1994 Planned Program:
- (U) Convert data to database format for computer analyses. ($1,186K)
- (U) Conduct serum dioxin analysis and complete serum dioxin assays. ($925K)
- (U) Complete analyses of serum dioxin half-life. ($856K)
- (U) Complete annual mortality update. ($719K)

(U) FY 1995 Planned Program:
- (U) Complete Year-10 morbidity report. ($670K)
- (U) Complete annual mortality update. ($730K)
- (U) Conduct statistical analysis of data sets. ($734K)
- (U) Complete archiving of baseline physical exams. ($500K)
- (U) Conduct additional analyses and reports. ($526K)

(U) Work Performed By: This program is conducted by an Integrated Product Team consisting of programmatic personnel from the Human Systems Program office (HSC/YA) and scientific personnel from the Armstrong Laboratory (HSC/AL). Both organizations are located at Brooks AFB. TX. The prime contractor is Science Application International Corp., McLean, VA.

(U) Related Activities: Not Applicable.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0605708F
PE Title: Nav/Radar/Sled-Track
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
06TG 46th Test Group Support								
22,074	22,147	23,023	23,639	23,961	24,886	25,877	N/A	N/A
2900 RATSCAT Upgrade								
2,000	2,000	2,000	2,000	2,000	2,000	2,000	Cont	TBD
688G Aircraft Navigation System Verification								
2,000	2,000	1,000	0	0	0	0	Cont	TBD
2904 Hypersonic Sled Track Development								
0	3,500 *	0	0	0	0	0	Cont	TBD
Total								
26,074	29,647	26,023	25,639	25,961	26,886	27,877	Cont	TBD

* Congressionally added program.

NOTE: This program element is an Air Force RDT&E Test Infrastructure account which provides direct support to the DOD test mission for the 46th Test Group at Holloman AFB NM. This infrastructure support provides minimum necessary support to keep the doors open for three major test facilities, High Speed Test Track (HSTT), Central Inertial Guidance Test Facility (CIGTF), Radar Target Scatter (RATSCAT) facility, and the North Area Avionics Test Site (NAATS). This PE also provides minor improvement upgrades to the RATSCAT facility.

B. (U) BRIEF DESCRIPTION OF ELEMENT: The 46th Test Group, a tenant organization at Holloman AFB, NM, is part of the Department of Defense (DOD) Major Range and Test Facility Base (MRTFB). The unique capabilities of the 46th Test Group include the High Speed Test Track (HSTT), Central Inertial Guidance Test Facility (CIGTF), and the Radar Target Scatter (RATSCAT) facility. Project 688G directly funds DOD-chartered testing of Inertial Navigation Systems. Funding from this PE supports test operations, maintenance, improvement, modernization, and personnel in three major areas. (1) The High Speed Test Track (HSTT) is the designated DOD reliance lead for test tracks and performs rocket sled testing of DOD aircraft ejection systems, explosive warheads, impact and lethality effects, guidance systems, and other tests requiring realistic simulations of acceleration or high velocity environments, including rain and particle erosion. (2) The Central Inertial Guidance Test Facility (CIGTF) is chartered to test integrated navigational aids, such as Global Positioning System (GPS) receivers, stellar trackers for aircraft, and is the Responsible Test Organization (RTO) for field tests of GPS user equipment. The CIGTF is the lead organization for testing Inertial Navigation Systems (INS) used in DOD aircraft and weapon systems. Performance and reliability of these systems are evaluated in unique one-of-a-kind precision test beds that are only available at Holloman AFB. CIGTF combined with the HSTT is the only DOD test agency capable of verifying the reliability of the

Program Element: #0605708F
PE Title: Nav/Radar/Sled-Track
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

nation's ICBM guidance systems. CIGTF is located at the most seismically quiet location within the nation and therefore is capable of performing ultra low noise type tests for its customers. (3) The RATSCAT facility includes two separate, complementary Radar Cross Section (RCS) measurement sites. The RATSCAT Advanced Measurement System (RAMS) provides highly secure, efficient, and quality measurements from VHF to Millimeter Wave (MMW) on sub-scale to full-scale advanced technology models up to 30,000 pounds. Main site provides the flexibility to measure monostatically and bistatically on multiple configurations ranging from sub-scale models to full-scale actual targets weighing up to 100,000 pounds. This PE funds test infrastructure overhead support including: command and supervisory staffs; supply stocks; upkeep, refurbishment, repair, and replacement of non-repairable or obsolete test equipment; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries, utilities, temporary duty travel, support contract costs for hardware and software engineering and maintenance; and minor improvement and modernization projects.

C. (U) PROJECT ACCOMPLISHMENTS AND PLANS

1. (U) Project: 06TG, 46th Test Group Support: This project funds test infrastructure overhead support including: command and supervisory staffs; supply stocks; upkeep, refurbishment, repair, and replacement of non-repairable or obsolete test equipment; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries, utilities, temporary duty travel, support contract costs for hardware and software engineering and maintenance. Project infrastructure support is provided for the unique capabilities of the 46th Test Group facilities; the High Speed Test Track (HSTT), Central Inertial Guidance Test Facility (CIGTF), and the Radar Target Scatter (RATSCAT) facility.

(U) FY 1993 Accomplishments:

- (U) Provided infrastructure test support for programs such as peacekeeper guidance systems testing, several Infrared Countermeasures (IRCM) systems, Crew Escape System Technology (CREST), the Army Advanced Kinetic Energy Munitions, Advanced Guidance Technology (AGT), aircraft navigation systems, Theater Missile Defense (TMD) hypersonic lethality testing, Patriot (PAC-3) lethality testing, advanced flare effectiveness testing, F-111 Improved Recovery Parachute (F-111 IRP), the Army Tactical Missile System (TACMS) dispenser testing, Israel/Army Arrow lethality testing, Arrow radome testing, Ground-Based Interceptor (GBI) testing, and several tests of rain erosions and aerothermal erosion on radome materials, GPS integrated and embedded INS programs, and SDI pointing and stabilization program. aircraft navigation systems, field test of the Federal Aviation Administration (FAA) GPS navigational and landing aids. improved stellar aided test capability, static RCS testing for both classified and unclassified programs, including both the B-2 and F-117A programs. ($21.074M)
- (U) Began and completed final checkout tests and preparation for the upcoming Mach 10 Sled test. ($0.200M)
- (U) Completed feasibility study for utilizing a magnetic levitation system at the sled track to achieve requested test velocities of Mach 11-12. ($0.200M)
- (U) Replaced obsolete machine tools to manufacture test sleds. ($0.600M)

Program Element: #0605708F
PE Title: Nav/Radar/Sled-Track
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) FY 1994 Plans:
- (U) Provide infrastructure test support for programs such as Advanced Inertial Measurement System (AIMS), Minuteman III, IRCM, TMD, PAC-3, F-111, Arrow, GBI, FAA GPS Precision Approach field tests, GPS integrated and imbedded INS programs, aircraft navigation systems, Standard Missile II, Advanced Tactical Infrared Countermeasures, F-22 egress testing, Fourth Generation Seat egress testing; Theater High Altitude Area Defense (THAAD) lethality testing, Special Infrared (SIR) flare testing, and Static RCS testing for both classified and unclassified programs, including the F-117A. ($21.147M)
- (U) Begin development of an automated trajectory system to reduce the cost of egress, flare and IRCM testing at the sled track deferred from FY 92. ($0.200M)
- (U) Support the development a magnetic levitation prototype system at the sled track. ($0.200M)
- (U) Replace obsolete data acquisition/computer systems for CIGTF, ($0.600M)

(U) FY 1995 Plans:
- (U) Provide infrastructure test support for programs such as AIMS, Minuteman III, IRCM, TMD, THAAD, PAC-3, F-111, Arrow, GBI, standard missile, FAA GPS Precision Approach field tests, GPS integrated and imbedded INS programs, aircraft navigation systems, Joint Primary Aircraft Training System egress testing, and static RCS testing for both classified and unclassified programs including the F-117A. ($21.323M)
- (U) Complete development of an automated trajectory system to reduce the cost of egress, flare and IRCM testing at the sled track deferred from FY 92. ($0.600M)
- (U) Continue development activities for the magnetic levitation system. ($0.500M)
- (U) Acquire updated computer systems to improve sled design development activities. ($0.600M)

(U) Work Performed By: In house workforce, EG&G Management Systems, Inc., Albuquerque, NM, and Intermetrics, Inc., Huntington Beach, CA.

(U) Related Activities:
- There is no unnecessary duplication of effort within the Air Force or the Department of Defense.
- The 46th Test Group capabilities have been reviewed by the DOD reliance group to prevent duplication and proliferation of unnecessary test facilities.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

Program Element: #0605708F
PE Title: Nav/Radar/Sled-Track
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

2. (U) Project: 2900, RATSCAT Upgrade. This project provides improvements to RATSCAT in order to assure support to address RCS measurement requirements of DOD customers. The goal is to aggressively pursue upgrades to present capabilities, to augment the Advanced Static RCS Measurement System without compromising or reducing current customer workload or security. Key areas of improvement include radar upgrades, standardization of data processing equipment and techniques, bistatic testing, mobile target shelter for security and environmental protection, advanced target support pylons with low radar returns, low frequency measurement capability upgrades, advanced real-time radar calibration equipment, engineering laboratory improvements, security system upgrades, efficiency related equipment and facilities. All these areas are imperative to maintain the current capabilities and meet the high technology requirements of customers that will use RATSCAT in the future. An extensive DoD R&D effort continues on radar cross section reduction techniques. This project ensures a continuing effort to improve the facility to address the needs of these newer and more demanding weapon system technologies.

(U) FY 1993 Accomplishments:
- (U) Initiated final acquisition phase for Radar VHF/UHF Measurement System (RVUMS). ($0.900M)
- (U) Design completed for improved Data Acquisition and Processing System (DAPS). ($0.700M)
- (U) Continued efforts to support the Advanced Static RCS project ($0.400M)

(U) FY 1994 Plans:
- (U) Complete final acquisition phase for RVUMS. ($0.900M)
- (U) Support for the Advanced Static RCS project. ($0.400M)
- (U) Initiate deficiency corrections for Integrated Radar Measurement Systems (IRMS). ($0.200M)
- (U) Complete fabrication of radar for the West Range ($0.500M)

(U) FY 1995 Plans:
- (U) Continue acquisition for the Data Acquisition and Processing System. (Mar 95) ($0.400M)
- (U) Complete deficiency corrections for Integrated Radar Measurement Systems (IRMS). ($0.500M)
- (U) Initiate phased acquisition for the Bistatic Coherent Measurement System (Mar 95) ($0.600M)
- (U) Initiate procurement of the next-generation pylons. ($0.500M)

(U) Work Performed By: 46th Test Group in-house (Govt) workforce, and EG&G Management Systems, Inc. Albuquerque, NM.

(U) Related Activities There is no unnecessary duplication of effort within the Air Force or the Department of Defense. The Advanced Static RCS Measurement System is also funded by the Central Test and Evaluation Investment Program (CTEIP), PE 0604940D.

Program Element: #0605708F
PE Title: Nav/Radar/Sled-Track
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) Other Appropriation Funds: None.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project: 688G, Aircraft Navigation System Verification: Project 688G is a DOD chartered program to conduct tests and evaluations on Inertial Navigation Systems (INS) and Inertially-Aided Navigation Systems (INS-Aided) for use in aircraft and weapon delivery systems and to provide an independent assessment of the performance to benefit DOD and foreign military testers like Canada and England. The purpose of this program is to provide technical performance information on manufacturer supplied navigation systems to Air Force and Navy System Program Offices and other offices that may use these navigation systems for their Off-the-Shelf selection use in their aircraft or weapons delivery system; which includes most of the high accuracy weapon systems now being employed. Project 688G also provides common support for these efforts with a flight reference system called the Completely Integrated Reference Instrumentation System (CIRIS). Tasks undertaken by this project include: INS, INS-Aided testing using a GPS receiver integrated with the INS, Air Force Standard INS qualification and verification testing, Form/Fit/Function Testing, and management and maintenance of CIRIS. This project will ensure a continuing effort to provide better technology in navigation systems for use in aircraft and weapons delivery systems for the DOD as well as foreign military testers.

(U) FY 1993 Accomplishments:
- (U) Continued test support for aircraft navigation systems and equipment, including GPS-aided and GPS User Equipment. ($0.500M)
- (U) Continued direct test support of B-1, TR-1, and B-2. ($0.700M)
- (U) Completed the first phase of the Advanced Reference System (ARS) by assembling a small rack version to support the navigation system testing for the B-1 tests. ($0.800M)

(U) FY 1994 Plans:
- (U) Continue test support for aircraft navigation systems and equipment, including GPS-aided and GPS User Equipment. ($1.2M)
- (U) Continue direct test support of B-1 and B-2. ($0.4M)
- (U) Expand the use of the ARS by reconfiguring the components to fit in a five inch pod enabling the ARS to be utilized on fighter-type aircraft. ($0.4M)

(U) FY 1995 Plans: This BPAC was reduced $1M to meet the Air Force budget reductions in the PBS.
- (U) Continue test support for aircraft navigation systems and equipment, including GPS-aided and GPS User Equipment. ($0.7M)
- (U) Continue direct test support of the B-1 and B-2. ($0.3M)

Program Element: #0605708F
PE Title: Nav/Radar/Sled-Track
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) Work Performed By: 46th Test Group in-house (Govt) workforce.
(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable

(U) International Cooperative Agreements: Not Applicable

3. (U) Project: 2904 Hypersonic Sled Track Development: This Project will develop a magnetic levitation (maglev) capability at the High Speed Test Track. The maglev system will enhance the Test Track's testing capability by reducing induced loads and vibration on test items and increasing the maximum test speed to Mac 10-12. This capability will support Theater Missile Defense lethality testing.

(U) FY 1993 Accomplishments:
- (U) This is a new BPAC with funding in FY94

(U) FY 1994 Plans:
- (U) Develop designs and prototypes for the construction of a maglev system. ($3.500M)

(U) FY 1995 Plans:
- (U) None.

(U) Work Performed By: 46th Test Group in-house (Govt) workforce, and a contractor (to be selected).

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or the Department of Defense. This project has been submitted to OSD for review for potential CTEIP funding in PE 0604940D for FY 1996 and beyond.

(U) Other Appropriation Funds: None.

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0605712F
PE Title: Initial Operational Test and Evaluation (IOT&E)
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ IN THOUSANDS).

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
0191 Initial Operational Test and Evaluation (IOT&E)								
28,398	27,656	33,504	24,629	27,055	34,773	31,476	Cont	N/A

B. (U) BRIEF DESCRIPTION OF ELEMENT. This program funds Air Force directed tests conducted to evaluate a system's operational effectiveness and suitability and to identify any operational deficiencies or need for modifications in support of the acquisition process. For major systems designated for use in combat, the law requires IOT&E be completed under realistic field conditions before proceeding beyond low rate initial production. This PE funds Congressionally mandated, Air Force directed IOT&E to support major weapon system acquisition decision (Milestone III). In addition, this PE will fund major Operational Utility Evaluations (OUE), Early Operational Assessments (EOA) and Operational Assessments (OA) which support major milestones and decision points prior to Milestone III. IOT&E is an operational evaluation of a system's performance when the complete system is tested and evaluated against operational criteria by personnel with the same qualifications as those who will operate, maintain and support the system when deployed. In general, IOT&Es are performed on new systems in development, major modifications and other systems as directed. IOT&E programs are identified in five categories: aircraft/support; space; missile/munitions; computer, communication, command and control and information (C4 I); and general. The FY95 list of programs may not be all inclusive due to changing program schedules and "pop-up" requirements.

C. (U) PROJECT ACCOMPLISHMENTS AND PLANS

(U) Initial Operational Test and Evaluation.

(U) FY93 Accomplishments: $28.398 million

- (U) HQ AFOTEC conducted IOT&E on the following 66 programs: Changes from the FY94 Descriptive Summary, deleted three programs, one program split into four programs (+3) and six pop-ups.

- (U) Category: Aircraft/Support
  Loader 60K, F-111 Digital Flight Control System (DFCS), Advanced Support Equipment (ASE), F-15C/E Tactical Electronic Warfare System (TEWS), F-16 ALE-47 (Chaff/Flare Dispenser), Tactics Training Route Complex Route Integration

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Date: February 1994

Instrumentation System (TTRC/RIIS), Bomber Airborne Instrumentation System (BAIS), C-17, B-IB Weapon System Trainer (WST), F-22 Advanced Tactical Fighter, Follow-on Tactical Reconnaissance System (FOTRS), B-2, Airborne Electronic Countermeasure Threat Simulator (AETS), Advanced X-Ray System, B-1B Conventional Munitions Upgrade Program (CMUP), AFMSS Conventional Mission Plan and Preparation System (CMPPS), Navstar GPS/2, F-16 Block 50D, EF-111A System Improvement Program (SIP), Advanced Strategic and Tactical IR Expend (ASTE), Compass Call Project 34, Compass Call Clean Sweep, and Compass Call 35.

- (U) Category: Space
Cheyenne Mountain Upgrade (CMU), CMU-Communications System Segment Replacement (CSSR Phase III), CMU-Survivable Communications Integration System (SCIS), Command Center Process and Display System Replacement/SAC (CCPDS-R/SAC), Ground Station Update for Satellite (DSP Mobile Ground Station), Cobra Dane System Modernization, CMU-Granite Sentry, CMU-Alternate Processing and Correlation Center (APCC), Command and Control Center Upgrades/Mobile Command Control System (MCCS) (Mobile C2 System), Space Command Center Upgrades (SPACC Upgrades), CMU-Space Defense Operations Center 4-C (SPADOC 4C), ICBM-Rapid Execution and Combat Target (REACT), Dual Frequency MEECN RCVR/Portable, Navstar GPS Phase III, Consolidated Space Operations Center (CSOC), Milstar, Pave Paws Upgrade Program (PPUP), Integrated Correlation and Display System (ICADS), CMU-Command Center Process and Display System-Replacement (CCPDS-R), Survivable Defense Satellite System (DSP-1), Have Stare Radar, Ground NDS Terminal (GNT), and Follow-on Early Warning System (FEWS).

- (U) Category: Missile/Munitions
QF-4, Improved Data Link (IDL)

-(U) Category: Computer, Communication, Command and Control and Information System (C4 I)
Survivable Restoral Vehicle/Tower Restoral Vehicle (SRV/TRV), E-4B Communications Enhancement MOD Block III-B (E-4B Block 3B MOD), JTIDS (JTIDS Class 2 terminal Multiservice), Joint Stars, E-3 Radar System Improvement Pgm (E-3 RSIP), Advanced Training System, ABO-Bratt Communications System (ABO-Base Recovery Communication Sys), AMC C-2 Info Processing System II-IV, Microwave Landing System (MLS-Mobile), Modular TACC (CTAPPS).

- (U) Category: General
Chemical Warfare Protective Equipment (CWD-Aircrew Eye/Respiratory Protection SAC), LS-Thermal Flash Blindness Protection, LS-Universal Water Activated Release System (LS-UWARS), RRR-Spall/Small Crater REP (SSCRS), CCD-Aircraft Decoy (Multispec Decoys), Active Noise Reduction (LS-ANR), Chemically Hardened Air Transportable Hospital (CHATH), and ABO-Armored Multi-Role Vehicle (ABO-ARMRV). Tactics Training Route Complex/Route Integration Instrumentation System (TTRC/RIIS): IOT&E successfully evaluated operational capabilities, and identified limitations and

Program Element: #0605712F
PE Title: Initial Operational Test and Evaluation (IOT&E)
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

required system improvements. Test efforts were accomplished in August 1993 with final report scheduled to be forwarded to HQ AFOTEC/CC for approval, in October 1993. F-22: An Operational Assessment (OA) was accomplished in FY93 for the F-22 Advanced Tactical Fighter (ATF). Advanced planning is being performed for the IOT&E of the F-22. Milstar: Team participated in program planning, documentation review test concept and Test Resource Plan. Completed Operational Assessment (OA) to support Core Terminal Buyout and Low Rate Initial Production (LRIP) decision Dec 92. Completed TPR 3, 19 April 93, and OSD test concept brief 30 Jul 93.

(U) FY94 IOT&E Planned Program: $27,656 million

- (U) HQ AFOTEC will conduct IOT&E on the following 122 programs. Changes from the FY94 Descriptive Summary: three programs completed, two deleted, two duplicate, +43. PMDs changed to read Qualification OT&E (O&M funded), eight pop-ups in 93 slipped into 94, and 32 new programs.

- (U) Category: Aircraft/Support
  Loader 60K, F-111 Digital Flight Control System (DFCS), Advanced Support Equipment (ASE), F-15C/E Tactical Electronic Warfare System (TEWS), Tactics Training Route Complex/Route Integration Instrumentation System (TTRC/RIIS), Bomber Airborne Instrumentation System (BAIS), C-17, F-22 Advanced Tactical Fighter, Follow-on Tactical Reconnaissance System (FOTRS), B-2, Advanced X-Ray System, B-1B Conventional Munitions Upgrade Pgm (CMUP), O AFMSS Conventional Mission Plan and Preparation System (CMPPS), F-16 Block 50D, EF-111A System Improvement Program (SIP), Advanced Strategic and Tactical IR Expend (ASTE), Compass Call 35, Compass Call Block III, CV-22 Osprey, Simulator For Elect Combat (SECT), Maintenance Skills Tutors (MST), F-15 Manned Destructive SEAD (MDS), KC-135 Expanded Refueling Capability (ERC), F/A-16 CAS/BAI Aircraft, Compass Call High Band System (HBS), Compass Call High Band Excit (HBE), Airlift Defensive System MOD (V), and Radio Frequency/CM External Pod.

- (U) Category: Space
  Cheyenne Mountain Upgrade (CMU), CMU-Survivable Communications Integration System (SCIS), CMU-Command Center Process and Display System-Replacement (CCPDS-R/SAC), Cobra Dane System Modernization, CMU-Granite Sentry, CMU-Alternate Processing and Correlation Center (APCC), ICBM-Rapid Execution and Combat Target (REACT), Dual Frequency MEECN RCVR/Portable, Navstar GPS Phase III, Consolidated Space Operations Center (CSOC), Milstar, Integrated Correlation and Display System (ICADS), CMU-Command Center Process and Display System-Replacement, Survivable Defense Satellite Program (DSP-1), Have Stare Radar, Follow-on Early Warning System (FEWS), Ballistic Missile Early Warning System Radar (BMEWS), Dual Frequency MEECN RCVR/Minuteman (DFMR/MM), Brilliant Eyes (BE), Ballistic Missile Defense (BMD)/Global Protection Against Limited Strikes (GPALS), Global Missile Defense (GMD), SDI Command

Program Element: #0605712F
PE Title: Initial Operational Test and Evaluation (IOT&E)
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Control Element (C2E), DMSP Block VI, Early Warning Radar, Ground Base Electro-Optical Deep Space Surveillance (GEODSS), and GPS BLOCK II Follow-on (GPS IIF).

- (U) Category: Missile/Munitions
QF-4, Sensor Fused Weapon (SFW), Joint Direct Attack Munitions (JDAM), Joint Standoff Weapon (JSOW), AOD-Joint Programmable Fuze (JPF), Improved Data Link (IDL), and AIM-9X Air-to-Air Missile (AIM-9X).

- (U) Category: Computer, Communication, Command and Control and Information System(C4 I)
Tower Restoral Vehicle (TRV), JTIDS (JTIDS Class 2 terminal Multiservice), Joint Stars, E-3 Radar System Improvement Pgm (E-3 RSIP), Advanced Training System, ABO-Base Recovery Communication Sys, AMC C-2 Info Processing System II-IV, Microwave Landing System (MLS-Mobile), Modular TACC (CTAPPS), DMSP Small Tactical Terminal (STT), E-4B Block V9 Minus HPTS MOD, Combat Survival Evader Locator (CSEL), LS-Aircraft Mishap Prevention (LS-AMP), Region/Sector Operations Control Center (R/SOCC), CWD-Automated NBC Reporting System (CWD-NBC), AF Training/Education Automated Management System(AFTEAMS), Combat Intelligence System(CIS), Improvement of Selected Intelligence Data Handling (IDHS), Solar Electro Optical Network (SEON II), Modular Control Equipment (MCE P3I), Combat Weather System(CWS), Global Transportation Network (GTN), Military Microwave Landing Sys-Avionics (MMLSA), and Microwave Landing Sys-Fixed Base (MLS-Fixed Base).

- (U) Category: General
CWD-Aircrew Eye/Respiratory Protection-SAC, LS-Universal Water Activated Release System (LS-UWARS), CCD Multispec Total Decoys (CCD-MS Decoy), LS-Active Noise Reduction (LS-ANR), Chemically Hardened Air Transportable Hospital (CHATH), ABO-Armored Multi-Role Vehicle (ABO-ARMRV), RRR-Mat Anchoring, AOD-Adverse Terrain Ammo Assembly (ATAAT/ATTV), CCD-Multispectral Smoke (CCD-MS Smoke, CCD-Multispectral Nets (CCD-MS Nets), CCD-Vertical Smoke and Obscurant (CCD-V Smoke), CCD-Fuzz Buster, CCD-Laser Warning/Laser Defeat (LASER), CSD-Spinal Cord Injury Transport System (SCITS), LS-Advanced Technology Anti-G Suit (ATAGS), CWD-Disposable Eye/Respiratory Protect (DERP), CWD-Mask Improvement Voice, AFF-Deployable Fire Protection System (AFF-Fire Protection), LS-Advanced Night Vision System, CCD-Runway Signature Characterization Disguise (CCD-RSCD, CSD-Transportable Blood Transshipment Center (CCD-TBTC), SAB-Electric Rapid Utility Repair Kits (RURK), SAB-Heating Ventilation and Air Condition (HVAC) Rurk, SAB-Water Rurk, ABO-EOD/Medical Protective Shield (ABO-EOD Shield), ABO-Mobile Ordnance Disrupter System(MODS), ABO-Buried Ordnance REM/Neutralization, RRR-Deployable Pavement Repair System, ABO-Rapid Ordnance Removable System (ABO-RORS), BISS Active Denial Sys, Environmental Control Unit (ECU) Replacement, LS-Passenger Smoke and Fume Protection, BISS-Automated Thermal Imagery Sys, ABO-Aircraft Expedient Dispersal Tech, ABO-EHR Munitions Stores Bins/Containers, CCD-Speed Trap, and CCD-Black Hole. E-3 RSIP: Retrofit of TS-3 will be completed. ET&E, Prequalification, and qualification testing scheduled. SFW: The pretest planning for the IOT&E of the Sensor Fuzed Weapon (SFW) will be accomplished at HQ AFOTEC. CV-22: Test

Program Element: #0605712F **Date:** February 1994
PE Title: Initial Operational Test and Evaluation (IOT&E)
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

preparation for test start in FY98 will be accomplished for the CV-22. Testing will evaluate the operational effectiveness and suitability of the CV-22 aircraft. An OA will be performed in Jun 94 through Jul 94.

(U) FY95 IOT&E Planning Program: $33.504 million
HQ AFOTEC will conduct IOT&E on the following 101 programs. The FY95 list of programs may not be all inclusive due to changing program schedules and "pop-up" requirements.

- (U) Category: Aircraft/Support
F-15C/E Tactical Electronic Warfare System (TEWS), C-17, F-22 Advanced Tactical Fighter, Follow-on Tactical Reconnaissance System (FOTRS), B-2, B-1B Conventional Munitions Upgrade Program (CMUP), F-16 Block 50D, EF-111A System Improvement Program (SIP), Advanced Strategic and Tactical IR Expend (ASTE), Compass Call Block III, Compass Call 35, CV-22 Osprey, Simulator For Elect Combat (SECT), F-15 Manned Destructive SEAD (MDS), KC-135R Expanded Refueling Capability (ERC), F/A-16 CAS/BAI Aircraft, Airlift Defensive System MOD (V), and Radio Frequency/CM External POD.

- (U) Category: Space
Cheyenne Mountain Upgrade (CMU), CMU-Survivable Communications Integration System (SCIS), Command Center Process and Display System-Replacement/SAC (CCPDS-R/SAC), CMU-Granite Sentry, CMU-Alternate Processing and Correlation Center (APCC), Space Command Center Upgrades (SPACC Upgrades), CMU-Space Defense Operation Center 4-C (SPADOC 4C), ICBM-Rapid Execution and Combat Target (REACT), Navstar GPS Phase III, Milstar, Integrated Correlation and Display System (ICADS), CMU-Command Center Process and Display System (CCPDS-R), Survivable Defense Satellite Program (DSP-1), HAVE STARE Radar, Ground NDS Terminal (GNT), Follow-on Early Warning System (FEWS), Ballistic Missile Early Warning System Radar Upgrade (BMEWS), Duel Frequency MEECN RCVR/Minuteman (DFMR/MM), Brilliant Eyes (BE), Ballistic Missile Defense (BMD)/Global Protection Against Limited Strikes (GPALS), Global Missile Defense (GMD), DMSP Block VI, Early Warning Radar, GND Base Electro-Optical Deep Space Survival (GEODSS), Airborne Laser Lab (ABL), and Space Command Center Upgrades (SPACC upgrades).

- (U) Category: Missile/Munitions
QF-4, Sensor Fused Weapon (SFW), Joint Direct Attack Munitions (JDAM), Joint Standoff Weapon (JSOW), AOD-Joint Programmable Fuze (JPF), AIM-9X Air-to Air Missile (AIM-9X), and AOD Proximity Sensor Fuze (AOD-PSF), and Improved Data Link (IDL).

- (U) Category: Computer, Communication, Command and Control and Information System(C4 I)
JTIDS (JTIDS Class 2 terminal Multiservice), Joint Stars, E-3 Radar System Improvement Program (E-3 RSIP), AMC C-2 Info Processing System II-IV, Modular TACC (CTAPPS), DMSP Small Tactical Terminal (STT), E-4B Block V9 minus HPTS MOD,

Program Element: #0605712F
PE Title: Initial Operational Test and Evaluation (IOT&E)
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

Combat Survival Evader Locator (CSEL), LS-Aircraft Mishap Prevention (LS-AMP), Region/Sector Operations Control Center (R/SOCC), CWD-Automated NBC Reporting System (CWD-NBC), AF Training/Education Automated Management System(AFTEAMS), Combat Intelligence System(CIS), Improvement of Selected Intelligence Data Handling (IDHS), Modular Control Equipment (MCE P3I), Combat Weather System(CWS), Global Transportation Network (GTN), and Military Microwave Landing Sys-Avionics (MMLSA).

- (U) Category: General
CCD-Multispectral Decoys (CCD-MS Decoy), LS-Active Noise Reduction (LS-ANR), Chemically Hardened Air Transportable Hospital (CHATH), ABO-Armored Multi-Role Vehicle (ABO-ARMRV), RRR-Mat Anchoring, AOD-Adverse Terrain AMMO Assem (ATAAT/ATTV), CCD-Multispectral Nets (CCD-MS Nets), CCD-Vertical Smoke and Obscurant (CCD-V Smoke), CCD-Fuzz Buster, CCD-Laser Warning/Laser Defeat (Laser), CSD-Spinal Cord Injury Transport System(SCITS), LS-Advanced Technology Anti-G Suit (ATAGS), CWD-Disposable Eye/Respiratory Protect (DERP), CWD-Mask Improvement Voice, AFF-Deployable Fire Protection System (AFF-Fire Protection), LS-Advanced Night Vision System (LS-ANVS), CCD-Runway Signature Characterization Disguise (CCD-RSCD), CSD-Transportable Blood Transshipment Center (CSD-TBTC), SAB-Electric Rapid Utility Repair Kits (RURK), SAB-Water RURK, ABO-EOD/Medical Protective Shield (ABO-EOD Shield), ABO-Mobile Ordnance Disrupter System(MODS), RRR-Deployable Pavement Repair System, ABO-Rapid Ordnance Removable System (ABO-RORS), BISS Active Denial System, Environmental Control Unit (ECU) Replacement, LS-Passenger Smoke and Fire Protection, ABO-Aircraft Expedient Dispersal Tech, ABO-EHR Munitions Stores Bins/Containers, CCD-Speed Trap, SAB-POL RURK, and CCD-Black Hole. Milstar: Plan completion of Milestone II of Milstar Polar Adjunct. Test Execution of terminal IOT&E Phase II in 1995. SFW: IOT&E scheduled to begin Oct 1994 and continue until 30 Jun 1995. Testing will be held at Eglin AFB, FL. C-17: IOT&E will end Jan 95, with the accomplishment of Milestone IIIB in Jul 95.

(U) Work Performed By: AFOTEC expends the highest percentage of its funding in-house in test execution. Support contracts are used to provide specialized expertise in functional disciplines related to test planning and analysis, through several genera and special support contracts of long duration. The five contractors supporting RDT&E activities are: Science Applications International Corp (SAIC), Albuquerque, NM; PRC, Inc, Albuquerque, NM; Booz, Allen & Hamilton, Albuquerque, NM; ENTEK, Inc, Albuquerque, NM; and Correa Enterprises, Inc, Albuquerque, NM.

(U) Related Activities: There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ In Thousands) Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0605807F
PE Title: Test and Evaluation Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

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

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
06RB Arnold Engineering Development Center (AEDC)								
154,775	151,662	146,961	155,143	158,015	168,870	171,822	N/A	N/A
06ZA Air Force Development Test Center (AFDTC)								
84,621	80,907	77,049	81,450	82,958	88,657	90,207	Cont	TBD
06YA Air Force Flight Test Center (AFFTC)								
99,714	136,903	143,290	151,264	154,065	164,646	167,526	Cont	TBD
06UC 4950th Test Wing (4950TW)/DMMF*								
47,873	6,000	6,076	0	0	0	0	Cont	TBD
1013 Utah Test and Training Range								
0	9,800	0	0	0	0	0	Cont	TBD
Total								
386,983	385,272	373,376	387,857	395,038	422,175	429,555	Cont	TBD

* In FY 94 most of 4950th funding transferred to the AFFTC. The remaining funds are used to support the Developmental Manufacturing and Modification Facility (DMMF).

B. (U) BRIEF DESCRIPTION OF ELEMENT AND MISSION NEED: The Test and Evaluation (T&E) Support program provides resources to operate the above Air Force test activities which are included in the Department of Defense (DOD) Major Range and Test Facility Base (MRTFB). The MRTFB is a national asset which is operated and maintained primarily for DOD test and evaluation missions, but is also available to other users (other government agencies, commercial industry, and foreign customers) having requirements for its unique capabilities. Test facilities/capabilities operated through this program include wind tunnels, rocket and jet engine test cells, space environmental simulation chambers, armament test ranges, climatic test facilities, avionics test facilities, aircraft testbeds, dry lakebed landing sites, and instrumented test ranges. T&E Support funds test infrastructure overhead activities including: command and supervisory staffs; supply stocks; upkeep, refurbishment, repair, and replacement of worn or obsolete test equipment; test infrastructure for data collection, transmission, reduction, and analysis; civilian salaries; utilities; temporary duty travel; support contract costs for hardware and software engineering and maintenance; and minor improvement and modernization projects. This program element experienced a significant increase in content starting in FY 92. These changes include the following: transfer of funds for depot level reparables, manpower realignment from O&M and MILPERS to RDT&E, conversion of military positions to civilian, transfer of funds to operate the Benefield Anechoic Facility, increases in state taxes, funds to operate and maintain new test facilities coming on line,

repair, and inflation/fuel cost increases. These changes appear to reflect program growth; however, the changes are all based on programmatic content changes. The specific changes are described for each test location.

C. (U) JUSTIFICATION FOR PROJECTS GREATER THAN $10 MILLION IN FY 1995:

1. (U) Project 06RB, Arnold Engineering Development Center (AEDC): The T&E Support Project at AEDC, located at Arnold TN, provides the test infrastructure overhead support to operate the largest complex of ground test facilities in the free world (includes transonic, supersonic, and hypersonic wind tunnels; rocket motor and turbine engine test cells; space environmental test chambers, hyperballistic ranges; and other specialized facilities). This project funds unique expenses such as plant upkeep; electricity and natural gas for heating, cooling, and lighting of 307 buildings (2,682,957 square feet); and the Tennessee Valley Authority demand charge for the test workload in support of the AEDC Applied Technology program. However, unlike other projects in this PE, AEDC is Air Force managed and contractor operated. Thus, this project's labor forces are civilian contractor. In order to provide the necessary technological/test expertise to weapon system test programs it is critical to maintain a core group of this work force. Together, these resources posture at the Center to support aircraft; missile, and space systems test at simulated flight conditions; and fund a technology program to develop advanced testing techniques and instrumentation required to test tomorrow's aerospace systems. Overall, the program's prime objective is to retain the bedrock resources that have enabled AEDC to contribute to the development of virtually all of the nation's top priority aerospace programs including ICBMs; aircraft like the F-117 Stealth Fighter, the B-2 Stealth Bomber, and the F-22 Fighter; missiles such as the Patriot and the Tomahawk cruise missile; and space systems to include the Space Shuttle and the Global Positioning System (GPS) satellite.

(U) FY 1993 Accomplishments:
- (U) Continued test infrastructure overhead support to enable testing for classified programs, and the F-15, F-16, F-18E/F, F-22, BMDO and other unclassified programs. ($144.975M)
- (U) Funded inflation on materials and services from FY92 to FY93. ($1.4M)
- (U) Funded annualized civilian pay raise. ($0.3M)
- (U) Funded contract mandated pay raises for contract work force. ($4.2M)
- (U) Continued support to DECADE facility and increased funding for test technology to improve productivity and enable meeting near-term and future customer test needs. ($2.2M)
- (U) Initiated installation of Aeropropulsion System Test Facility (ASTF) icing capability to support advanced aircraft test needs. ($1.7M)

(U) FY 1994 Plans:
- (U) Continue test infrastructure overhead support to enable testing for classified programs, and the F-15, F-16, F-18E/F, F-22, B-1 Conventional Stores Certification, BMDO and other unclassified programs. ($143.162M)
- (U) Fund inflation on materials and services from FY93 to FY94. ($1.5M)
- (U) Fund contract mandated pay raises for support contractor workforce. ($3.9M)

Program Element: #0605807F
PE Title: Test and Evaluation Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 -Defense-wide Mission Support

Date: February 18, 1994

- (U) Fund Operations and Maintenance for new facilities: High Temperature Lab Addition ($0.4M), Large Rocket Test Facility ($1.0M), and Improved Ballistic Range. ($0.5M)
- (U) Provide for ASTF icing capability to support advanced aircraft test needs. ($1.2M)

(U) FY 1995 Plans:
- (U) Continue test infrastructure overhead support to enable testing for classified programs, and the F-18E/F, F-22, B-1 Conventional Stores Certification, BMDO and other unclassified programs. ($140.881M)
- (U) Fund inflation on materials and services from FY94 to FY95. ($1.5M)
- (U) Fund civilian pay raise. ($0.3M)
- (U) Fund contract mandated pay raises for support contractor workforce. ($3.8M)
- (U) O&M for new facilities: 10V Modification. ($0.5M)

(U) Work Performed By: Primary contractors performing test support include Sverdrup Technology, Inc., Calspan Corporation, and SSI Services, Inc.

(U) Related Activities:
- (U) PE 0605878F, Maintenance and Repair; PE 0605876F, Minor Construction; and PE 0605856F, Environmental Compliance.
- (U) PE 0605896F, Base Operations RDT&E. (Base Operating support)
- (U) PE 0604759F, Major T&E Investment (Technical capability improvement and Modernization)
- (U) PE 060940D, Test Instrumentation Development. (T&E Investments for new tri-service test capabilities)
- (U) There is no unnecessary duplication of effort within the Air Force and the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not applicable.

(U) International Cooperative Agreements: Not applicable.

2. (U) Project 06ZA, Air Force Development Test Center (AFDTC): The T&E Support project at AFDTC, located at Eglin AFB, FL, provides the test infrastructure overhead support for non-nuclear air armaments (including aircraft guns, ammunition, bombs, and missiles) and EC systems for DOD and allied forces. AFDTC provides a scientific test process that supports the development and enhancement of munitions and electronic combat systems. This process reduces the risk of acquisition programs and ensures military equipment will work in the combat environment. The process included modeling and simulation, measurement testing, hardware-in-the-loop testing, and open air range testing. This test process uses the Freeman Mathematical Laboratory, McKinley Climatic Test Chamber, Preflight Integration of Munitions and Electronic Systems (PRIMES) facility, Guided Weapons Evaluation Facility (GWEF), and the Armament System Test Environment (ASTE) and the Electromagnetic Test Environment (EMTE) open air ranges. AFDTC operates a highly instrumented land/water range test complex in the Gulf area. In addition,

Program Element: #0605807F
PE Title: Test and Evaluation Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 -Defense-wide Mission Support

Date: February 18, 1994

this PE funds AFDTC's overhead costs for checkout, training and currency flying for aircrews supporting the test mission. Funding pays salaries for a government work force of 1170 civilians responsible for maintaining AFDTC's role as a center of expertise in electronic combat and air-to-air/air-to-surface munitions integrated test and evaluation. This PE also funds operations and maintenance contracts employing a workforce of 943 people necessary to support testing on this 724 square mile land and 86,500 square mile water range.

(U) FY 1993 Accomplishments:
- (U) Provided test infrastructure overhead support for non-nuclear air armaments (AMRAAM, SEEK EAGLE, BLU-109, GBU-28, etc);), climatic simulation (B-2, C-17, AC-130U Gunship, etc); Electronic combat (TEWS, EF-111F, JSTARS, Band 4 Systems Improvement Program; and C4I (JSTARS, AWACS, BISS, JTIDS, etc). ($67.021M)
- (U) Increase for inflation. ($2.5M)
- (U) Funded depot level reparables. ($12.7M)
- (U) Provided funds to Poker Flats. ($2.4M)

(U) FY 1994 Plans:
- (U) Continue test infrastructure overhead support for non-nuclear air armaments (AMRAAM, SEEK EAGLE, BLU-109, GBU-29, etc); climatic simulation (B-2, etc); Electronic combat (ASTE, JTIDS, F15-TWES, JSTARS, Band 4 Systems Improvement Program, etc); and C4I (JTIDS, Airborne SINCGARS, BISS, etc)($78.307M)
- (U) Increases for inflation. ($2.6M)

(U) FY 1995 Plans:
- (U) Continue test infrastructure overhead support for non-nuclear air armaments (AMRAAM, SEEK EAGLE, TMD, JDAM, JSOW, ASRAAM, AIM-9); Electronic combat (JSTARS, F15-TEWS, etc); C4I (JTIDS, AWACS, BISS, Combat Intelligence Systems, Combat Weather Systems, etc) ($74.649M)
- (U) Increase for inflation.($2.4M)

(U) Work Performed By: In-house work force and VITRO Services, Ft. Walton Beach, FL.

(U) Related Activities:
- (U) PE 0605878F, Maintenance and Repair, PE 0605876F, Minor Construction and 0605856F, Environmental Compliance.
- (U) PE 0605896F, Base Operations RDT&E. (Base operating support)
- (U) PE 0604759F, Major T&E Investments
- (U) PE 0604256F, Threat Simulator Development. (Range improvement for development of electronic combat threat systems, operations/support)
- (U) PE 0604940D, Test Instrumentation Development. (T&E Investments for new tri-service test capabilities)

Program Element: #0605807F
PE Title: Test and Evaluation Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 -Defense-wide Mission Support

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- (U) PE 0605863F, RDT&E Aircraft Support. (Depot Maintenance Funds to support Air Force Material Command test and evaluation aircraft)
- (U) There is no unnecessary duplication of effort within the Air Force and the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not applicable.

(U) International Cooperative Agreements: Not applicable.

3. (U) Project 06YA, Air Force Flight Test Center (AFFTC): The T&E Support project at the AFFTC, located at Edwards AFB, CA, provides test infrastructure overhead support for development and operational test and evaluation support for aircraft and aircraft systems, aerospace research vehicle, unmanned miniature vehicle, cruise missiles, parachute delivery/recovery systems, and cargo handling systems. Recovery support and engineering evaluation is provided to the Space Shuttle program and other transatmospheric vehicles. AFFTC operates two instrumented ranges: the Edwards Flight Test Range and the Utah Test and Training Range (funded in FY 93 in PE 0708019F by the O&M appropriation). The Center consists of the Air Force Test Pilot School (AFTPS); one Test Wing consisting of two Test Groups, ten Test Squadrons, five Maintenance Squadrons, two Range Squadrons, and one Supply Squadron; one Support Wing; and Center level command and staff functions. Funding supports major generic ground test capabilities such as the Integrated Facility for Avionics Simulation Tests (IFAST), Test and Evaluation Mission Simulator (TEMS), and the Benefield Anechoic Facility (BAF) (formally known as the Air Force Anechoic Facility). In addition this PE funds AFFTC's overhead costs for checkout, training and currency flying for aircrews supporting the test mission and the general overhead costs of the test organizations associated with providing test program support, as well as the total costs of the AFTPS. With the transfer of Depot Level Reparables to this account in FY92, the AFFTC had a large funding increase due to the many varying mission aircraft requiring special ground test equipment. These DLR's include range instrumentation support, Special Purpose Recoverables Authorized to Maintenance (SPRAM), and IFAST instrumentation. Funding pays for a government and contractor work force responsible for providing test support consistent with AFFTC's role as center of expertise for aerodynamic/avionics systems test and evaluation. Also included are operations and maintenance contracts necessary to support testing on the range.

4950th Test Wing (4950 TW): The T&E Support Project at the 4950th Test Wing, Aeronautical Systems Center, Wright-Patterson AFB, OH, provides the test infrastructure overhead support for flight tests of aircraft and airborne systems; and supports space vehicle data tracking for Air Force Space Command (AFSC), other DOD agencies, and the National Aeronautics and Space Administration (NASA). The Wing operates Air Force Materiel Command's large testbed aircraft and flight test aircraft modification facility and provides limited manufacturing support, on a non-interference basis with research and development, to Air Force and other Department of Defense components through the use of computer aided design/computer aided manufacturing (CAD/CAM). Flight tests range from evaluations of electronic systems such as radar, navigation, and Command, Control and Communications to aerodynamic and structural evaluations of highly modified RDT&E aircraft. Staging out of US and overseas bases, the Advanced Range Instrumentation Aircraft (ARIA) fleet of eight aircraft provide telemetry support for the NASA and

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PE Title: Test and Evaluation Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 -Defense-wide Mission Support

DOD missile launches. In addition, this PE funds the 4950TW's overhead costs for checkout, training and currency flying for aircrews supporting the test mission. Funding also supports a government work force of 838 civilians responsible for maintaining 4950th TW's role as center of expertise in avionics sub-systems, CAD/CAM, and testing commercial aircraft. The flying mission of the 4950TW is being consolidated into the AFFTC (412TW) at Edwards AFB under BRAC, with a completion in March 1994.

Utah Test and Training Range (UTTR): The T&E Support Project at UTTR, located at Hill AFB, UT, provides test infrastructure overhead support for development and operational test and evaluation of aircraft and aircraft systems, unmanned vehicles, and cruise missiles. UTTR also provides overhead support for multi-Service training programs. The overall UTTR project includes operation and maintenance, procurement, and manpower funding to support test facilities and equipment. Funding provides for planning, air traffic control, communications data collection, processing and analysis, and range safety. UTTR also has a variety of ground target and test stands to support operational and test communities. There is not another comparable combination of land (280 sq miles) and airspace anywhere in the United States. This effort is a zero base transfer from PE 078019F starting in FY 1994.

(U) FY 1993 Accomplishments:
- (U) Continue test infrastructure overhead support to enable testing of the B-1B, B-2, F-16, F-15, F-15E, F-22, AFTI/F-16, C-17, Gunship/Combat Talon II, and classified programs. ($111.287M)
- (U) Inflation from FY92 to FY93. ($2.4M)
- (U) Annualized pay raises. ($2.5M)
- (U) Fund ground equipment depot level reparables.($.3M)
- (U) Fund implementation of JOCAS II and provide hardware and software for management measurement systems. ($1.2M)
- (U) Military to civilian manpower conversion. ($1.4M)
- (U) Continue program of replacement/modernization of aging range, shop, air frame, and simulation systems and equipment at FY92 levels. ($2.1M)
- (U) Continue BAF operation and support as avionics intensive weapon systems testing increases in both ground facilities and during flight. ($4.6M)
- (U) Continue test infrastructure overhead support for ARIA SMILS and flight test support with increase for fuel adjustment and inflation. ($2.0M)
- (U) Purchase remainder of spare test equipment for CMMCA. ($0.6)
- (U) Continue technical order and documentation update of Test Wing aircraft with projected completion in FY94. ($1.5M)
- (U) Complete ECCM/ARTB and begin full support funding for the new test capability on a C-141 aircraft. ($1.4M)
- (U) Fund ground equipment depot level reparables. ($1.5M)

(U) FY 1994 Plans:

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- (U) Continue test infrastructure overhead to support the B-1B, B-2, F-16, F-15, F-15E, F-22, AFTI/F-16, Gunship/ Combat Talon II, C-17, Benefield Anechoic Facility, ARIA, SMILS, ECCM/ARTB, and classified programs. ($93.303M)
- (U) Inflation. ($2.7M)
- (U) Fund military to civilian manpower position conversions. ($1.4M)
- (U) Partially implement reimbursable policy for flying depot level reparables. ($2.6M)
- (U) Complete the move of the 4950TW to Edwards AFB with the final flight of the ARTB in March 1994. ($36.9M)
- (U) Transfer operating costs for UTTR to RDT&E funds. ($9.8M)

(U) FY 1995 Plans:
- (U) Continue test infrastructure overhead to support the B-1B, B-2, F-16, F-15, F-15E, F-22, AFTI/F-16, Gunship/ Combat Talon II, C-17, BAF, and classified programs. ($137.990M)
- (U) Fund civilian pay raise. ($1.1M)
- (U) Inflation. ($2.8M)
- (U) Fund military to civilian manpower conversions. ($1.4M)

(U) Work Performed By: Primary contractor performing test support is Computer Science Corporation (CSC), Lancaster, CA.

(U) Related Activities:
- (U) PE 0605678F, Maintenance and Repair; PE 0605876F, Minor Construction; and PE 0605856F, Environmental compliance. (Property maintenance and environmental compliance)
- (U) PE 0605896F, Base Operations RDT&E. (Base operating support)
- (U) PE 0604759F, Improved Capability for DT&E. (Technical capability improvement and modernization)
- (U) PE 0604256F, Threat Simulator Development. (Range improvement for development of electronic combat threat systems, operations/support)
- (U) PE 0605863F, RDT&E Aircraft Support. (Depot Maintenance Funds to support Air Force Material Command test and evaluation aircraft)
- (U) PE 0708019F, Utah Test and Training Range Operations. (Operation and maintenance of Utah Test and Training Range Office appropriation account)
- (U) There is no unnecessary duplication of effort within the Air Force and the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not applicable.

(U) International Cooperative Agreements: Not applicable.

Program Element: #0605807F
PE Title: Test and Evaluation Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 -Defense-wide Mission Support

Date: February 18, 1994

4. (U) Project 06UC, Developmental Manufacturing and Modification Facility (DMMF): This T&E support project is located at ASC, Wright-Patterson AFB OH. It was created as a result of the 4950th Test Wing consolidation with AFFTC and became a separate ASC organization on 1 Oct 93. Its mission is to provide engineering design and analysis, fabrication, and aircraft modification support to the AF MRTFB. The DMMF accomplishes structural, electrical, and/or aerodynamic aircraft modifications to support the installation of systems and components for flight test; fabrication and installation of flight test instrumentation; installation, support, and upgrade of aircraft test bed projects, (i.e., ARIA, ECCM/ARTB, etc.), engineered demodifications of test projects, and is the AFMC functional manager for T-2 modifications. In addition, the DMMF designs and fabricates ground equipment to support aircraft test operations, test articles, and ground test facility modifications and test support components. The DMMF has approximately 400 personnel, three aircraft modification hangars, a 200,000 sq ft shop floor with 46 CNC machine tools, and an integrated computer-aided design and manufacturing capability. This PE funds indirect labor and supporting expenses required for this mission. This includes maintaining engineering, fabrication, and computer/communication systems and equipment. Prior to FY 94, the Developmental Modification and Manufacturing Facility (DMMF) was part of the 4950th Test Wing (06UC) with a Direct Budget Authority of $14.8M in FY93.

(U) FY 1993 Accomplishments:
- (U) Continued upgrade of obsolete shop, manufacturing and computer equipment in support of flight test. ($.6M)
- (U) Continued test modification (instrument upgrades) and repair support for ARIA aircraft ($.6M)
- (U) Continued documentation review of Test Wing Aircraft: C-18, C-135.($.4M)
- (U) Conducted T-39 modifications (pod carriage and GPS) and demodifications. ($.5M)
- (U) Installed improved photo window. ($.2M)
- (U) Continued support of ECCM on the Advanced Radar Test Bed. ($.3M)
- (U) Funded indirect labor and supporting expenses (training, travel, office supplies, contractor support, etc.) in support of T&E RBA programs (HYDICE, ABIT, ARGUS, ABL, SAWS De-Mod, Little Crow, MC-130H Cooling Mod, etc.). ($12.2M)

(U) FY 1994 Plans:
- (U) Funds indirect labor and supporting expenses (training, travel, office supplies, etc.) and support services required for the DMMF mission in support of RBA programs in excess of $27.6M. ($5.077M)
- (U) Continue funding for investment equipment supporting fabrication, modification, and engineering process.($0.540M)
- (U) Funds facility improvement and modernization. ($0.043M)
- (U) Continue funding for equipment maintenance. ($0.340M)

(U) FY 1995 Plans:
- (U) Funds indirect labor and supporting expenses (training, travel, office supplies, etc.) and support services required for the DMMF mission in support of RBA programs in excess of $25.9M. ($5.153M)
- (U) Continue funding for investment equipment supporting fabrication, modification, and engineering process. ($0.540M)

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PE Title: Test and Evaluation Support
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- (U) Funds facility improvement and modernization. ($0.043M)
- (U) Continue funding for equipment maintenance. ($0.340M)

(U) Work Performed By: In house government employees.

(U) Related Activities:
- (U) PE 0604759F, Major Test and Evaluation Investment.
- (U) There is no unnecessary duplication of effort within the Air Force and the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0605808F
PE Title: Development Planning
Budget Activity: #6-RDT&E Management Support
Old Budget Activity: #6-Defense Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ In Thousands):

FY 93 Actual	FY 94 Est	FY 95 Est	FY 96 Est	FY 97 Est	FY 98 Est	FY 99 Est	To Complete	Total Program
Development Planning								
9,543	6,674	9,959	10,189	10,218	10,477	10,792	Continuing	TBD
9,543	6,674	9,959	10,189	10,218	10,477	10,792	Continuing	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: The Air Force is transitioning to the new DoD 5000 series regulations which mandate that a full range of requirements analyses be conducted to identify and substantiate current operational deficiencies. This is a significant change and has a substantial impact on the pre-Milestone I process. The new guidance transitions the acquisition process from a technology-push to an analytically justified requirements-pull process. First, a Mission Area Assessment (MAA) is conducted to identify and substantiate the operational deficiency and conduct a review of non-materiel alternatives to solve the deficiency. These deficiencies must relate directly to assigned Air Force operational roles, missions, and supporting tasks that cannot be performed efficiently, or in a cost effective manner. Second, if non-materiel alternatives do not exist, a Mission Needs Analysis (MNA) is conducted to identify potential cost effective, materiel alternatives. Non-materiel alternatives include doctrine, tactics, training, and organizational changes. Materiel alternatives considered will include all existing DoD, Allied, and non-developmental systems. Operational requirements analyses and supporting acquisition milestone documentation includes MAAs, MNAs, and Mission Need Statements (MNS). Phase 0 concepts studies and Cost and Operational Effectiveness Analyses (COEAs) are not conducted in this program element. This PE is in 6.5 because the efforts perform operational requirements studies and analyses directed in support of assigned mission areas. There is no unnecessary duplication of effort within the Air Force or DoD.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

(U) Development Planning: Mission need determination enables the Air Force to systematically analyze and quantify its operational deficiencies and identify potential cost effective alternatives for further concept development and analysis. Alternatives include continuing with

Program Element: #0605808F
PE Title: Development Planning
Budget Activity: #6-RDT&E Management Support
Old Budget Activity: #6-Defense Wide Mission Support

Date: February 1994

existing systems or developing an improved capability for the operational forces. If deficiencies are determined, they are documented in a Mission Need Statement (MNS) required for concept studies approval (MS 0).

(U) FY 1993 Accomplishments:

- (U) - Completed assessment of Integrated Satellite Control System architectural elements--assists USSPACECOM in selection of optimal architecture.
- (U) - Completed evaluation of combining standard and tactical cargo loader capabilities into a single replacement.
- (U) - Completed concept development and cost tradeoff analysis of options for protecting passengers on airlift aircraft from smoke and toxic fumes.
- (U) - Completed documentation support for Contingency Theater Automated Planning System (CTAPS).
- (U) - Completed mission area assessment capability to identify and evaluate options for bomb damage assessment--Desert Storm lessons learned.
- (U) - Completed mission needs analysis for fighter and bomber initial pilot training--extend life of T-38 aircraft.
- (U) - Continued mission needs analysis for next generation air-to-surface munitions.
- (U) - Continued requirements analyses of theater missile defense--operational concepts include AWACS long range surveillance, JSTARS improvements to assist attack ops, and autonomous air vehicle participation.
- (U) - Continued IDEF modeling/analysis of Air Mobility Command C2 processes to identify mission area deficiencies.
- (U) - Continued mission area assessment to refine assessment capability for hostile target identification--determine effective, high payoff technologies.
- (U) - Continued development of assessment capability to identify operational tactical satellites options to support battlefield commander.
- (U) - Continued requirements analyses for existing weather prediction models to support Tactical Forecast System and determine operational utility of fusing meteorological satellite data with other meteorological data in theater weather center.
- (U) - Continued requirements analyses of potential alternatives to provide simultaneous jam resistant aircraft intra-flight and inter-flight comm.
- (U) - Initiate mission area assessment of regional threats to large aircraft --supports documented deficiencies in Air Combat Command, Air Mobility Command, and Air Force Special Operations Command.
- (U) - Initiate mission area assessment capability to identify C4I options for theater battle management--builds on Air Mobility Command's C4I analysis.

Program Element: #0605808F
PE Title: Development Planning
Budget Activity: #6-RDT&E Management Support
Old Budget Activity: #6-Defense Wide Mission Support

Date: February 1994

(U) FY 1994 Plans:
- (U) - Continue to identify operational deficiencies through Mission Area Assessments and Mission Needs Analysis.
- (U) - Complete mission area assessment/mission needs analysis to identify most promising alternatives in the area of aircraft emanations detection/interceptibilitiy and explore system integration factors that effectively enhance situation awareness.
- (U) - Complete identification of architecture for in-theater weather prediction and determine operational utility of fusing meteorological satellite data with other meteorological data in theater weather center.
- (U) - Complete mission need analysis for destruction of non-emitting surface-to-air targets and investigate alternatives for incorporation into existing aircraft/munition programs.
- (U) - Continue IDEF modeling/analyses Air Mobility Command C2 processes--resolve mission area C2 deficiencies.
- (U) - Continue surveillance and reconnaisance mission area assessment to identify architecture alternatives to support the battlefield commander.
- (U) - Continue mission needs analysis for next generation air-to-surface munitions.
- (U) - Continue to requirements analyses for theater missile defense.
- (U) - Continue mission area assessment capability to identify and evaluate options for hostile target identification--transition selected options to existing programs.
- (U) - Continue mission area assessment/mission needs analysis of C4I architectures for Theater Battle Management.

(U) FY 1995 Plans:
- (U) - Continue to identify operational deficiencies through Mission Area Assessments and Mission Needs Analysis.
- (U) - Complete development of a merged IDEF Air Mobility Command C2 processes to identify mission area deficiencies.
- (U) - Complete mission area assessment capability to identify and evaluate options for hostile target identification--transition selected options to existing programs.
- (U) - Continue surveillance and reconnaisance mission area assessment to identify architecture alternatives to support the battlefield commander.
- (U) - Continue mission needs analysis for next generation air-to-surface munitions.
- (U) - Continue requirements analyses for theater missile defense concepts.
- (U) - Continue mission area assessment/mission needs analysis of C4I architectures for Theater Battle Management.

Program Element: #0605808F
PE Title: Development Planning
Budget Activity: #6-RDT&E Management Support
Old Budget Activity: #6-Defense Wide Mission Support

Date: February 1994

(U) Work Performed By: Efforts typically use in-house analysts and multiple contractors to perform detailed technical assessments to include mission area assessments and mission needs analyses. In-house analysts include: Aeronautical Systems Center, Wright-Patterson AFB OH; Electronic Systems Center, Hanscom AFB MA; Human Systems Center, Brooks AFB TX; and Space and Missile Center, Los Angeles AFB CA. Typical contractors include: Ball Systems Engineering, Martin Marietta, Grumman, Lockheed, Logicon, General Dynamics, Northrop, Sverdrup, Battelle, Techolote, Nichols Research, Draper, Quest Technology, and Boeing.

(U) Related Activities:
- (U) - Projects funded by this program element analyzes potential nonmateriel and materiel alternatives that include integrating emerging technology into on-going weapon system programs. Army uses O&M to support similar mission needs analyses. Navy uses multiple PEs to support similar mission needs analyses.
- (U) - The Joint Potential Designator to be determined at Milestone 1. PE only supports pre-Milestone O requirements analyses.
- (U) - There is no unnecessary duplication of effort within the Air Force or DoD.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Assessments: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #605856F
PE Title: Environmental Compliance
Budget Activity: #6-RDT&E Management Support
Old Budget Activity: #6-Defensewide Mission Support

Date: February 1994

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

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
24,113	39,355	42,876	38,505	38,334	39,121	40,047	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides essential RDT&E Management Support for Environmental Compliance (EC) services at three Air Force Material Command Major Range and Test Facility Bases (MRTFBs): Eglin AFB, FL; Edwards AFB, CA; and Arnold AFB, TN. The account provides funds for Operations and Services (O&S), Level I (currently out of compliance with federal, state or local environmental law) and Level II (pending compliance deadline in the future) and Level III (not currently under law, but will enhance the environment) requirements. Typical projects/services include hazardous waste management and disposal; upgrade and removal of underground fuel storage tanks; air and water pollution compliance projects; asbestos abatement and disposal; and polychlorinated biphenyl elimination. Also funds for environmental sampling and analysis, studies, testing and inspections; permits and fees; National Environmental Policy Act (NEPA) actions; and natural, cultural and historic land management. EC funding supports the RDT&E management efforts at Air Force RDT&E facilities.

C. (U) JUSTIFICATION FOR PROJECTS GREATER THAN $10 MILLION IN BOTH FY 1995:

(U) Project 6606EC, Environmental Compliance (EC): Project funds EC projects and "must pay" operations and services to comply with environmental protection and compliance laws and regulations on environmental hazardous waste; hazardous waste disposal; underground fuel storage tanks; air pollution; wetlands delineation and management; water pollution; studies testing, inspection and repair of processing equipment; natural, cultural and historic land management and related administration.

Program Element: #605856F
PE Title: Environmental Compliance
Budget Activity: #6-RDT&E Management Support
Old Budget Activity: #6-Defensewide Mission Support

Date: February 1994

(U) FY 1993 Accomplishments:

- (U) - $15.5M in FY93 supporting critical "must fund" operations and services (O&S) requirements to meet day-to-day operations, such as: civilian pay; hazardous waste management and disposal; and environmental permits and fees.
- (U) - $7.5M funded Level I (out of compliance) items.
- (U) - $1.1M funded Level II requirements. Level II items are required to meet future compliance dates.

(U) FY 1994 Plans:

- (U) - $25.6M in FY94 for essential "must pay" O&S requirements, such as civilian pay; hazardous waste management and disposal; and environmental permits and fees.
- (U) - $13.7M funds Level I (out of compliance) requirements.
- (U) - The increased funding in FY94 is sufficient to address all known requirements through Level I.

(U) FY 1995 Plans:

- (U) - $26.3M in FY94 for essential "must pay" O&S requirements, such as civilian pay; hazardous waste management and disposal; and environmental permits and fees.
- (U) - $9.4M will fund all the base projects classified as Level I (out of compliance).
- (U) - $7.2M will fund a limited number of projects classified as Level II (required to meet a future compliance date). Funding will only permit accomplishment of the most critical of these requirements that would go out of compliance during the program FY.
- (U) - The funding in FY95 will continue to alleviate the backlog of Level II requirements, especially upgrade of underground fuel storage tanks, oil and water separators, upgrade storm and sanitary sewer systems, and control of air emissions per latest Clean Air Act amendments and State implementation plans. Funds clean up of hazardous waste, provides cultural resources protective measures, endangered species controls and natural resources conservation.

(U) Work Performed By: In-house work force: Conerly Construction, FL; Lord & Son Construction, FL; SSI, PA; Sverdrup Inc, MI; Cal Span Corp, OH; Steven's Construction, CA; Foote Corp, CA.

Program Element: #605856F
PE Title: Environmental Compliance
Budget Activity: #6-RDT&E Management Support
Old Budget Activity: #6-Defensewide Mission Support

Date: February 1994

(U) Related Activities:
- (U) - PE0605807F, Test and Evaluation Support (TES), provides the mission funds for civilian personnel at Arnold AFB since mission support consumes almost all personnel efforts.
- (U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not applicable.

(U) International Cooperative Agreements: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0605863F
PE Title: RDT&E Aircraft Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
2111 Air Force Development Center (AFDTC)								
6,275	11,922	5,351	9,801	9,088	9,633	9,520	Cont	TBD
2112 Air Force Flight Test Center (AFFTC)								
13,778	11,205	29,125	31,507	31,970	33,082	34,000	Cont	TBD
2114 4950th Test Wing (Merged with 2112 Air Force Flight Test Center)								
18,895	16,309	0	0	0	0	0	Cont	TBD
Total								
38,948	39,436	34,476	41,308	41,058	42,715	43,520	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: The RDT&E aircraft support program provides resources for maintaining Air Force Materiel Command (AFMC) assigned test and test support coded aircraft which are included as a portion of the Department of Defense Major Range and Test Facility Base (MRTFB). This program supports 168 RDT&E aircraft of 18 different types. These include a multitude of configurations, with many prototype, preproduction, and extensively modified/instrumented one-of-a-kind aircraft. Funds pay for depot level maintenance such as: Programmed Depot Maintenance (PDM), the calendar-based cyclic scheduling of aircraft into depots for update/inspection; modifications and any other depot level repairs required by the aircraft System Program Directors (SPD); engine overhauls and engine modules; depot-provided area assistance; and assorted ground support equipment overhauls that require reimbursement.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995

1. (U) Project: 2111, Air Force Development Test Center (AFDTC): The Air Force Development Test Center (AFDTC), Eglin AFB FL, is the primary USAF organization responsible for non-nuclear munitions armament development. AFDTC accomplishes RDT&E and initial acquisition of USAF non-nuclear munitions; is the USAF focal point for munitions integration in aeronautical systems; and conducts USAF weapons effectiveness testing and electromagnetic warfare/electronic combat testing. AFDTC currently has the following types and quantities of test/test support aircraft assigned: NC-130A (1); F-15A (2); F-15B (3); F-15D (1); F-15E (2); F-16A (1); F-16B (4); F-16C (4); F-16D (2); F-111E (2); F-111F (3); UH-1N(2); and AT-38B (2). Total aircraft assigned: 29.

Program Element: #0605863F **Date:** February 1994
PE Title: RDT&E Aircraft Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

(U) FY 1993 Accomplishments:
- (U) Performed PDM on two RF-4Cs ($1.7M), one F-15B.
- (U) Performed annual Analytical Condition Evaluation (ACE) and On-Condition Maintenance (OCM) on one UH-1N.
- (U) Modified/updated four F100-220E engines in preparation for F-16 aircraft tests.
- (U) Delivered eight F-16s for modification/update at Ogden Air Logistics Center.
- (U) Flew 5,354 hours which generated corresponding engine overhaul requirements.

(U) FY 1994 Plans:
- (U) Perform PDM on one F-15D. ($1.200M)
- (U) Perform F-16 miscellaneous work $.020M for one aircraft. ($0.022M)
- (U) Overhaul five Special Purpose Vehicles (SPV) (one P-12, two R-9s, and two P-8s). ($0.200M)
- (U) Fly 6,630 hours which will generate corresponding engine overhaul requirements. ($10.000M)
- (U) Perform Area Assistance. ($0.500M)

(U) FY 1995 Plans:
- (U) Overhaul seven SPV's (two MB-4s, four P-12s, and one P-8). ($0.251M)
- (U) Perform miscellaneous work on F-16. ($0.300M)
- (U) Fly 6,820 hours which will generate corresponding engine overhaul requirements. ($4.300M)
- (U) Perform Area Assistance. ($0.500M)

(U) Work Performed By: Depot level maintenance is performed either organically by the Air Force Materiel Command (AFMC) Air Logistic Centers (ALCs) or contractually with the ALCs negotiating/ administering the contract. Organically, work is performed at all five AFMC ALCs. Contractually, work is performed by McDonnell Douglas Corp., Tulsa, OK; Boeing Military Airplane Company, Wichita, KS; Lockheed, Marietta, GA; PEMCO, Birmingham, AL; and Lockheed, Ft. Worth, TX.

(U) Related Activities:
- (U) PE 0605807F, Test and Evaluation Support. (Test aircraft operation).
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds: Not applicable.

(U) International Cooperative Agreements: Not applicable.

2. (U) Project: 2112, Air Force Flight Test Center (AFFTC): The Air Flight Test Center (AFFTC), Edwards AFB CA, conducts and supports test of aircraft and aircraft systems, aerospace research vehicles, remotely piloted vehicles, cruise missiles and parachute delivery/recovery systems. Support of AFFTC aircraft located at the 514th Test Squadron at Hill AFB, UT, is also

Program Element: #0605863F
PE Title: RDT&E Aircraft Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

Date: February 1994

funded within this project. The AFFTC currently has the following types and quantities of test/test support aircraft assigned: A-37B (4); AC-130U (3); B-1B (2); B-2A (6); B-52G (1); B-52H (1); C-17A (6); C-23A (3); HC-130H (1); MC-130H (2); NC-130B(1); NC-130H(2); C-135C (1); F-15A(4); F-15B (6); NT-39A (1); NT-39B (4); F-15D (2); F-15E (3); F-16A (9); F-16B (16); F-16C (7); F-16D (2); HH-1H(4); UH-1N (3); MH-60G (3); T-38A (20) and NC-141A (3). Total aircraft assigned: 120.

(U) FY 1993 Accomplishments:
- (U) Performed PDM on one B-1B, and two F-15As.
- (U) Performed Analytical Condition Evaluations (ACE) on four HH-1Hs, two UH-1H, and two MH-60Gs.
- (U) Delivered twelve F-16s for modifications at Hill AFB, UT.
- (U) Delivered four T-38s for modification/update.
- (U) Replaced wing on NC-130B.
- (U) Flew 25,458 hours at Edwards AFB and Hill AFB which generated corresponding engine overhaul requirements.
- (U) Delivered five F-16 F-100-220E engines for modification/update at Hill AFB, UT.

(U) FY 1994 Plans:
- (U) Perform PDM on one F-15B ($1.200M), and one F-15D. ($1.200M)
- (U) Perform annual ACEs on four HH-1Hs, two UN-1Ns, and two MH-60G's. ($0.010M)
- (U) Perform On Condition Maintenance on one UH-1Ns. ($0.690M)
- (U) Overhaul seven Special Purpose Vehicles (two compressed gas trailers, three MB-4s, and two R-9s). ($0.250M)
- (U) Perform miscellaneous work on F-16s. ($0.756M)
- (U) Paint three aircraft. ($0.099M)
- (U) Fly 26,963 hours at Edwards AFB and Hill AFB which will generate corresponding engine overhaul requirements. ($6.500M)
- (U) Provide Area Assistance. ($0.500M)

(U) FY 1995 Plans:
- (U) Perform PDM on one C-130H ($1.000M), one F-15D ($1.200M), two F-15Es ($2.400M), two C-135C/Es ($3.400M), one EC-135 ($1.700M), and one NKC-135E ($1.700M).
- (U) Perform C-18 Component Overhauls and Sustaining Engineering on one C-18. ($3.200M)
- (U) Perform ACEs on four UH-1Ns, three MH-60Gs, and four HH-1Hs. ($0.010M)
- (U) Perform F-16 miscellaneous work. ($0.280M)
- (U) Overhaul five SPVs. ($0.250M)
- (U) Fly 31,417 hours at Edwards AFB and Hill AFB which will generate corresponding engine overhaul requirements. ($13.300M)
- (U) Perform Area Assistance. ($0.685M)

Program Element: #0605863F
PE Title: RDT&E Aircraft Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

Date: February 1994

(U) Work Performed By: Depot level maintenance is performed either organically by the Air Force Materiel Command (AFMC) Air Logistic Centers (ALCs) or contractually with the ALCs negotiation/ administering the contract. Organically, work is performed at all five AFMC ALCs. Contractually, work is performed by McDonnell Douglas Corp., Tulsa, OK; Boeing Military Airplane Company, Wichita, KS; Lockheed, Marietta, GA; PEMCO, Birmingham, AL; and Vought Corp., Dallas, TX.

(U) Related Activities:
- (U) PE 0605807F, Test and Evaluation Support, (Test Aircraft Operation).
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project: 2114, 4950th Test Wing: The 4950th Test Wing, Aeronautical Systems Center (ASC), Wright-Patterson AFB, OH, performs flight tests of aircraft and airborne systems, and supports space vehicle tracking for DOD and the National Aeronautics and Space Administration. The 4950th Test Wing currently has the following types and quantities of test/test support aircraft assigned: C-18B (1); EC-18B (4); EC-18D (2); C-135A (2); C-135C (1); C-135E (2); EC-135E (4); NKC-135E (2); and NC-141A (1). Total aircraft assigned: 19. Additionally, ASC is responsible for aircraft leased to contractors, loaned to other Government agencies, or furnished to contractors under Government Furnished Property (GFP) clauses. The Air Force programs and pays for support of these aircraft through the 4950th Test Wing account. Based on current and projected FY93/94 contracts and agreements, AFMC is responsible for costs associated with one NC-131H, one NT-33A, and the VISTA F-16. Costs for these three aircraft are included in the 4950th Test Wing project.

(U) FY 1993 Accomplishments:
- (U) Performed PDM on one C-18, and two C-135s.
- (U) Performed special inspections on the NC-131H and the NT-33A.
- (U) Performed component overhauls and sustaining engineering projects on one C-18.
- (U) Rewrote/updated C-18 Tech Order.
- (U) Flew 7,340 flying hours which generated corresponding engine overhaul requirements.

(U) FY 1994 Plans:
- (U) Perform PDM on one C-18 ($4.100M), one EC-135E ($1.700M), and one C-141A. ($1.700M)
- (U) Perform special inspections on the C-131H and the NT-33A. ($0.609M)
- (U) Perform component overhauls and sustaining engineering on one C-18. ($2.400M)
- (U) Perform other miscellaneous work on one C-141A. ($0.500M)

Program Element: #0605863F
PE Title: RDT&E Aircraft Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

Date: February 1994

- (U) Fly 6,850 flying hours which will generate corresponding engine overhaul requirements. ($4.800M)
- (U) Perform Area Assistance. ($0.500M)

(U) FY 1995 Plans: Not Applicable

(U) Work Performed by: Depot level maintenance is performed either organically by the Air Force Materiel Command (AFMC) Air Logistic Centers (ALCs) or contractually with the ALCs negotiating/ administering the contract. Organically, work is performed at the five AFMC ALCs. Contractually, work is performed by E-Systems, Inc., Greenville, TX; Boeing Military Airplane Company, Seattle, WA; Lockheed, Marietta, GA; and the Vought Corp., Dallas TX.

(U) Related Activities:
- (U) PE 0605807F, Test and Evaluation Support. (Test aircraft operations).
- (U) There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0605876F
PE Title: Minor Construction
Budget Activity: 6, RDT&E Management Support
Old Budget Activity: 6, Defense-Wide Mission Support

Date: February , 1994

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
6606MC, Minor Construction								
2,899	7,467	3,281	3,678	3,757	3,933	4,126	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides essential Minor Construction (MC) at three Air Force Materiel Command Major Range and Test Facility Bases (MRTFBs): Eglin AFB, FL, Edwards AFB CA, and Arnold AFB, TN. Physical plant maintained by this account covers 800,000 acres of land; over four thousand structures in excess of 30 years old encompassing fifteen million square feet; over five million square yards of airfield pavement; 1900 miles of road network; utility systems that include 120 wells, 10 sewage treatment plants, 20 substations and over 1600 miles of high voltage electrical distribution lines. Program Element is designated Budget Activity 6 to support the RDT&E infrastructure and provides adequate facilities to accomplish the Test Mission.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995 :

1. (U) 6606MC, Minor Construction (MC): Project adapts facilities to current mission needs and standards (in-house and by contract) through additions, alterations, replacements, relocations, new facilities, and related administration. Physical plant of the three MRTFBs has a replacement value in excess of $7 billion. Minimum investment level in the physical plant is essential to assure continued mission support.

(U) FY 1993 Accomplishments:
(U) – $2.7M of the FY93 program was used to support in-house work force (supplies, materials and equipment to finance in-house work).
(U) – $0.2M was used to construct by contract an Aerospace Ground Equipment Wash Rack Cover.

Program Element: 0605876F
PE Title: Minor Construction
Budget Activity: 6, RDT&E Management Support
Old Budget Activity: 6, Defense-Wide Mission Support

Date: February , 1994

(U) FY 1994 Plans:

(U) – $2.8M of the FY94 program is for in-house work force (supplies, materials and equipment to finance in-house work).

(U) – $4.7M is for MC by contract. Increased funding for this fiscal year is due to a concerted effort to increase support to this PE to offset past funding shortfalls. FY93 was the first active year of this PE; funding was previously accomplished in PE 65894F. In FY93, there were virtually no funds available to finance Minor Construction by contract. Upgrades are required to adapt facilities to dynamic changes in technology and mission. The increase in FY94 will help in accomplishing the necessary upgrades. Examples of projects funded are:

- (U) – $453K, installation of lightning protection in munitions storage facilities.
- (U) – $222K to construct engine test facility maintenance shop addition.
- (U) – $250K to modify dormitory fire escapes.
- (U) – $445K for installation of utility meters.
- (U) – $212K to renovate and upgrade fire, police and communications building.
- (U) – $197K to modify propulsion wind tunnel transformer.
- (U) – $186K to modify air compressor and test building crane.
- (U) – $269K to replace chillers in aeropropulsion system test facility.
- (U) – $161K to construct engine test facility maintenance shop addition.
- (U) – $177K to install taxiway lights.
- (U) – $300K to construct refueling maintenance facility.
- (U) – $300K to construct avionics laboratory.
- (U) – $200K to construct disaster preparedness facility

(U) FY 1995 Plans:

(U) – $2.9M of the FY95 program is for in-house work force (supplies, materials and equipment to finance in-house work).

(U) – $.4M is available for accomplishment of MC by contract. It will be used to accomplish the most critical of construction requirements at the three Major Range and Test Facility Bases (MRTFBs) and those what will provide the greatest return in support of the Research, Development and Test Mission.

(U) Work Performed By: In-house work force; Conerly Construction, FL; Lord & Son Construction, FL; SSI, PA; Sverdrup Inc, MI; Cal Span Corp, OH; Steven's Construction, CA; Foote Corp, CA.

(U) Related Activities:

(U) – PE0605807F, Test and Evaluation Support (TES), provides the mission funds for civilian personnel at Arnold AFB since mission support consumes almost all personnel efforts.

Program Element: #0605876F
PE Title: Minor Construction
Budget Activity: 6, RDT&E Management Support
Old Budget Activity: 6, Defense-Wide Mission Support

Date: February, 1994

(U) – There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Date: February, 1994

Program Element: 0605878F
PE Title: Maintenance and Repair
Budget Activity: 6. RDT&E Management Support
Old Budget Activity: 6. Defense-Wide Mission Support

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
6606MR, Maintenance and Repair of Real Property								
48,868	41,070	51,904	58,092	59,416	62,170	65,162	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides essential Real Property Maintenance and Repair at three Air Force Materiel Command Major Range and Test Facility Bases (MRTFBs): Patrick AFB, FL; Edwards AFB, CA; and Arnold AFB, TN. Physical plant maintained by this account covers: 800,000 acres of land; over four thousand structures in excess of 30 years old; encompassing fifteen million square feet; over five million square yards of airfield pavement; 1900 miles of road network; utility systems that include 120 wells, 10 sewage treatment plants, 20 substations and over 1600 miles of high voltage electrical distribution lines. Program Element is designated Budget Activity 6 to support the RDT&E infrastructure and provides adequate maintenance and repair of facilities to accomplish the Test Mission.

C. (U) JUSTIFICATION FOR PROJECTS GREATER THAN $10 MILLION IN FY 1995:

1. (U) 6606MR, Maintenance and Repair of Real Property: Project funds the maintenance and repair (M&R) of basic infrastructure and complex test facilities to slow deterioration, ensure preservation of Air Force facility investment and supports related administration. Physical plant of the three MRTFBs has a replacement value in excess of $7 billion. Minimum investment in repairing and maintaining the physical plant is essential to assure continued mission support.

(U) FY 1993 Accomplishments:
- (U) – $32.2M of the FY93 program was required to support in-house work force (payroll, supplies, materials and equipment to finance in-house work).
- (U) – $16.7M was used to accomplish real property maintenance by contract. Examples are:
  - (U) – $2.0M-remove asbestos.
  - (U) – $750K-remove and repair oil water separators.
  - (U) – $796K-replace 14-horsepower rotor for the plenum evacuation system.

Program Element: 0605878F
PE Title: Maintenance and Repair
Budget Activity: 6, RDT&E Management Support
Old Budget Activity: 6, Defense-Wide Mission Support

Date: February, 1994

(U) – $979K-repair leaks in the engine test facility plant refrigeration.
(U) – $734K-paint propulsion wind tunnel crane structure.
(U) – $451K-repair propulsion wind tunnel lube system.
(U) – $252K-replace propulsion wind tunnel number 3 transformer.
(U) – $3.4M-overlay runway.
(U) – $280K-repair Lancaster Boulevard.
(U) – $910K-repair base overhead power lines.
(U) – $187K-replace igloo doors and lights.
(U) – $1.4M-repair building 5602.
(U) – $1.1M-repair various heating, ventilation and air conditioning systems.

(U) FY 1994 Plans:

(U) – $34.1M of the FY94 program is for in-house maintenance and repair work force (payroll, supplies, materials and equipment to finance in-house work).

(U) – $7.0M is for Maintenance and Repair (M&R) by contract for mission requirements to offset current deterioration of the physical plant. Decreased funding in this fiscal year will cause deferral of facility projects and will contributed to further deterioration of the physical plant. In cases where limited or decreased funding precludes the use of contracts, emergency in-house M&R projects can only be accomplished when there is a major infrastructure failure. Accomplishing emergency M&R projects will result in more costly repairs later because of collateral damage done to facilities all of which could result in the delay of vital weapon system testing. Examples of projects to be accomplished are:

(U) – $6.0M-requirements contract, repair roofs.
(U) – $328K-replace 11 aeropropulsion system test facility valves.
(U) – $700K-repair airfield asphalt.

(U) FY 1995 Plans:

(U) – $34.2M of the FY95 program is for in-house M&R work force (payroll, supplies, materials and equipment to finance in-house work).

(U) – $17.7M is for M&R of real property by contract. The increase in funding in FY95 provides the minimum essential level required to maintain and repair test support infrastructure. We must make this investment in the maintenance and repair of facilities or the infrastructure will continue to deteriorate because requirements will continue to outpace the available funds. The FY94 funding level caused deferral of the following critical projects which will be accomplished in FY95:

(U) – $450K-replace compressor rotor discs.
(U) – $565K-overlay roads, main base.
(U) – $250K-repair hangar doors, hangar 130.

Program Element: 0605878F
PE Title: Maintenance and Repair
Budget Activity: 6, RDT&E Management Support
Old Budget Activity: 6, Defense-Wide Mission Support

Date: February, 1994

(U) – $1.1M-repair engine test facility.
(U) – $487K-replace refrigerant reefer units.
(U) – $200K-resurface motor pool compound.
(U) – $522K-replace Von Karmen Facility number 2 transformer.
(U) – $586K-replace plenum escape system aftercooler bundles.
(U) – $700K-repair airfield asphalt.
(U) – $1.4M-repair overhead lines, dorm area.
(U) – $1.4M-repair VAQ, Edwards AFB
(U) – $2.0M-repair water lines.
(U) – $1.0M-repair (electrical) substation No. 5, Phillips Laboratory.
(U) – $250K-repair street lighting, Phillips Laboratory.
(U) – $500K-repair various sewer lines.
(U) – $250K-repair water lines, Aircraft Dynamics Research Building 1820, Edwards AFB.
(U) – $300K-repair reservation road.
(U) – $500K-repair runway field 1.
(U) – $2.6M-replace chillers, Armament Research Facilities, building 11 and 13, Eglin AFB.
(U) – $1.2M-overlay railroad (Bob Sikes Road)
(U) – $850K-re-roof miscellaneous buildings.
(U) – $800K-replace heating, ventilation and air conditioning various buildings.

(U) Work Performed By: In-house work force; Conerly Construction, FL; and Lord & son Construction, FL; SSI, PA; Sverdrup Inc, MI; Cal Span Corp, OH; Stevens Construction, CA; Foote Corp, CA.

(U) Related Activities:
(U) – PE0605807F, Test and Evaluation Support (TES), provides the mission funds for civilian personnel at Arnold AFB since mission support consumes almost all personnel efforts.
(U) – There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0605878F
PE Title: Maintenance and Repair
Budget Activity: 6, RDT&E Management Support
Old Budget Activity: 6, Defense-Wide Mission Support

Date: February, 1994

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
6606MR, Maintenance and Repair of Real Property								
48,868	41,070	51,904	58,092	59,416	62,170	65,162	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides essential Real Property Maintenance and Repair at three Air Force Materiel Command Major Range and Test Facility Bases (MRTFBs): Eglin AFB, FL; Edwards AFB, CA; and Arnold AFB, TN. Physical plant maintained by this account covers: 800,000 acres of land; over four thousand structures in excess of 30 years old; encompassing fifteen million square feet; over five million square yards of airfield pavement; 1900 miles of road network; utility systems that include 120 wells, 10 sewage treatment plants, 20 substations and over 1600 miles of high voltage electrical distribution lines. Program Element is designated Budget Activity 6 to support the RDT&E infrastructure and provides adequate maintenance and repair of facilities to accomplish the Test Mission.

C. (U) JUSTIFICATION FOR PROJECTS GREATER THAN $10 MILLION IN FY 1995 :

1. (U) 5606MR, Maintenance and Repair of Real Property: Project funds the maintenance and repair (M&R) of basic infrastructure and complex test facilities to slow deterioration, ensure preservation of Air Force facility investment and supports related administration. Physical plant of the three MRTFBs has a replacement value in excess of $7 billion. Minimum investment in repairing and maintaining the physical plant is essential to assure continued mission support.

(U) FY 1993 Accomplishments:
- (U) – $32.2M of the FY93 program was required to support in-house work force (payroll, supplies, materials and equipment to finance in-house work).
- (U) – $16.7M was used to accomplish real property maintenance by contract. Examples are:
  - (U) – $2.0M-remove asbestos.
  - (U) – $750K-remove and repair oil water separators.
  - (U) – $796K-replace 14-horsepower rotor for the plenum evacuation system.

Program Element: 0605878F
PE Title: Maintenance and Repair
Budget Activity: 6, RDT&E Management Support
Old Budget Activity: 6, Defense-Wide Mission Support

Date: February, 1994

(U) – $979K-repair leaks in the engine test facility plant refrigeration.
(U) – $734K-paint propulsion wind tunnel crane structure.
(U) – $451K-repair propulsion wind tunnel lube system.
(U) – $252K-replace propulsion wind tunnel number 3 transformer.
(U) – $3.4M-overlay runway.
(U) – $280K-repair Lancaster Boulevard.
(U) – $910K-repair base overhead power lines.
(U) – $187K-replace igloo doors and lights.
(U) – $1.4M-repair building 5602.
(U) – $1.1M-repair various heating, ventilation and air conditioning systems.

(U) FY 1994 Plans:

(U) – $34.1M of the FY94 program is for in-house maintenance and repair work force (payroll, supplies, materials and equipment to finance in-house work).

(U) – $7.0M is for Maintenance and Repair (M&R) by contract for mission requirements to offset current deterioration of the physical plant. Decreased funding in this fiscal year will cause deferral of facility projects and will contributed to further deterioration of the physical plant. In cases where limited or decreased funding precludes the use of contracts, emergency in-house M&R projects can only be accomplished when there is a major infrastructure failure. Accomplishing emergency M&R projects will result in more costly repairs later because of collateral damage done to facilities all of which could result in the delay of vital weapon system testing. Examples of projects to be accomplished are:

(U) – $6.0M-requirements contract, repair roofs.
(U) – $328K-replace 11 aeropropulsion system test facility valves.
(U) – $700K-repair airfield asphalt.

(U) FY 1995 Plans:

(U) – $34.2M of the FY95 program is for in-house M&R work force (payroll, supplies, materials and equipment to finance in-house work).

(U) – $17.7M is for M&R of real property by contract. The increase in funding in FY95 provides the minimum essential level required to maintain and repair test support infrastructure. We must make this investment in the maintenance and repair of facilities or the infrastructure will continue to deteriorate because requirements will continue to outpace the available funds. The FY94 funding level caused deferral of the following critical projects which will be accomplished in FY95:

(U) – $450K-replace compressor rotor discs.
(U) – $565K-overlay roads, main base.
(U) – $250K-repair hangar doors, hangar 130.

Date: February, 1994

Program Element: 0605878F
PE Title: Maintenance and Repair
Budget Activity: 6, RDT&E Management Support
Old Budget Activity: 6, Defense-Wide Mission Support

(U) – $1.1M-repair engine test facility.
(U) – $487K-replace refrigerant reefer units.
(U) – $200K-resurface motor pool compound.
(U) – $522K-replace Von Karmen Facility number 2 transformer.
(U) – $586K-replace plenum escape system aftercooler bundles.
(U) – $700K-repair airfield asphalt.
(U) – $1.4M-repair overhead lines, dorm area.
(U) – $1.4M-repair VAQ, Edwards AFB
(U) – $2.0M-repair water lines.
(U) – $1.0M-repair (electrical) substation No. 5, Phillips Laboratory.
(U) – $250K-repair street lighting, Phillips Laboratory.
(U) – $500K-repair various sewer lines.
(U) – $250K-repair water lines, Aircraft Dynamics Research Building 1820, Edwards AFB.
(U) – $300K-repair reservation road.
(U) – $500K-repair runway field 1.
(U) – $2.6M-replace chillers, Armament Research Facilities, building 11 and 13, Eglin AFB.
(U) – $1.2M-overlay railroad (Bob Sikes Road)
(U) – $850K-re-roof miscellaneous buildings.
(U) – $800K-replace heating, ventilation and air conditioning various buildings.

(U) Work Performed By: In-house work force; Conerly Construction, FL; and Lord & son Construction, FL; SSI, PA; Sverdrup Inc, MI; Cal Span Corp, OH; Stevens Construction, CA; Foote Corp, CA.

(U) Related Activities:
(U) – PE0605807F, Test and Evaluation Support (TES), provides the mission funds for civilian personnel at Arnold AFB since mission support consumes almost all personnel efforts.
(U) – There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0605896F
PE Title: Base Operations Support
Budget Activity: #6- RDT&E Management Support
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ In Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complet	Total Program
6606BS Base Operating Support								
62,215	65,534	60,839	59,329	66,884	68,965	71,192	Cont	TBD
6606CE Other Support								
17,700	21,076	20,595	20,473	21,044	25,011	30,010	Cont	TBD
6606UT Operations of Utilities								
24,019	24,740	25,480	26,246	27,033	27,845	28,680	Cont	TBD
Total								
103,934	111,350	106,914	106,048	114,961	121,821	129,882	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides basic, essential services of base operating support at three Air Force Materiel Command (AFMC) bases: Eglin AFB FL, Edwards AFB CA, and Arnold AFB TN. These three Air Force Bases form the core of the Air Force Test and Evaluation infrastructure to support the DoD test mission. These bases are unique national assets specifically established for test and evaluation and are funded by RDT&E appropriations. The program finances "open-the-doors" cost of day-to-day support for the Air Force portion of the DoD Major Range and Test Facility Bases (MRTFBs). These three locations have over 90 tenant organizations and an aggregate population in excess of 55,000 people. Civilian payroll represents approximately 47 percent of the total program, with the remainder of the program financing administrative support, security and guard services, dormitories, billeting, food services, training, utility operations, civil engineering services, transportation, and motor pools. Functions supported by this program element include comptroller, chaplain, personnel, supply, transportation and information management.

C. (U) JUSTIFICATION FOR PROJECTS GREATER THAN $10 MILLION IN FY 1995:

1. (U) 6606BS, Base Operations: Finances essential base operating support which includes civilian pay, security and guard services, dormitories, billeting, food services, training, transportation and motor pools, comptroller, chaplain, supply, information management and quality of life services for the three bases.

Program Element: #0605896E
PE Title: Base Operations Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

Date: February 1994

(U) FY 1993 Accomplishments:

- (U) Financed civilian payroll, which includes regular salary and wages, retirement, health benefits and compensation for overtime work. ($42.2M)
- (U) Financed rental and lease of General Services Administration (GSA) vehicles to support mission and mobility requirements; augment security police fleet and general purpose types such as dump trucks, pick-up trucks, ambulances, handicap van, sedans, caravans, and buses. ($2.5M)
- (U) Financed mission-oriented travel in support of air operability exercises; mandatory fire prevention training; life safety code courses; hazardous material courses; rescue and other specialized training, water and waste treatment plant certification; supported disaster preparedness teams and coordination of hurricane evacuation plans and associated training. ($1.0M)
- (U) Provided for contract services; the contract services program is the principal vehicle for providing base operating support. Finances the base information transfer center, postal service center, publishing distribution office, food service mess attendant contract for dining facilities, flight kitchen, pastry parlor, fire fighter crash kitchen, base linen exchange, base switchboard, cable television, customs inspections, religious services, animal control services and other miscellaneous base contract services. ($8.4M)
- (U) Financed day-to-day essential supplies for mission operations, clothing for troops, telephone instruments and wire for the communications squadron, bench stock, bulk issues, and miscellaneous building materials for civil engineering, administrative supplies, general and system support division supplies, and housekeeping supplies. Finances chemicals for the water wells and sewage treatment plants, procurement of paramedic type medical supplies for wartime and peacetime mobility teams and fire department and mission essential materials through the hospital medical material system. ($6.5M)
- (U) Financed education and training which included tuition assistance, long term and full time training; supported high school, associate, baccalaureate and graduate level education programs for base assigned military and civilian personnel; short course training which permits military personnel to obtain essential job related short-term training not available through normal DoD channels; non-personnel service contracts which provide for a test proctor, education services advisor, and a night facility manager; total quality training which covers off-site training at civilian institutions, seminars, and conferences. ($1.6M)

(U) FY 1994 Plans:

- (U) Civilian payroll. ($40.9M) Decrease in requirement due to transfer of personnel to Defense Finance and Accounting System. ($1.3M)
- (U) Mission-related travel. ($1.5M)
- (U) Rental and lease of General Services Administration (GSA) vehicles. ($2.5M)
- (U) Transportation costs for property moved by commercial means for military and civilian personnel permanent change of station moves. ($1.7M)

Program Element: #0605896F
PE Title: Base Operations Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

Date: February 1994

- (U) Leased long lines, base administrative telephone system and two foreign exchange trunks to Nashville, TN from Arnold AFB. The leased circuits support the command, control, communications and computer systems. They also directly support consolidated base personnel office, civilian personnel, base equipment analysis and management system, vehicle inspections management system, accounting and finance, central computer facility and others. ($1.3M)
- (U) On-going mission essential training. Requirement includes certification of personnel assigned to positions requiring acquisition program management certification. ($2.9M)
- (U) Will finance maintenance of a broad assortment of equipment associated with Base Support functions, including office machines; repair of government property such as billeting furniture; storage and retrieval systems; special purpose vehicles not covered under the GSA vehicle maintenance contact; radar speed units for security police; land mobile radios and equipment housed in the frequency management vans; walking straddle stacker which is a mid-sized pallet jack for supply; microfilm system; mechanical small item retriever system; document image processing system; and the work information management system for civil engineering. ($7.3M)
- (U) Day-to-day essential supplies for mission operations. The PE experienced a three percent general reduction in FY93 and a $20M cut by the Congress due to perceived growth. Subsequently, some of the FY93 requirements have rolled to FY94. ($7.4M)

(U) FY 1995 Plans:
- (U) Finances civilian payroll ($42.7M)
- (U) Finances mission related travel. ($2.1M)
- (U) Finances GSA general purpose vehicles. ($2.0M)
- (U) Provides transportation of property via commercial methods for military and civilian personnel moves, as well as the cost of packing and crating, parcel post and demurrage charges for government property. ($1.6M)
- (U) Provides for commercial telephone service, modems, equipment, Defense Switching Network (DSN) and foreign trunk lines. ($3.4M)
- (U) Provides education and training for military and civilian personnel. ($4.0M)
- (U) Provides contract services for base operating support. ($2.2M)
- (U) Provides day-to-day essential stock fund supplies for mission operations. ($2.8M)

(U) Work Performed By: In-house work force; Kass Management Services Inc., CA; Management Tech Services, CA; Computer Sciences Corp., CA; Madison Services, MI; General Physics Corp., MD and SSI Services, Inc., PA.

Program Element: #0605896F
PE Title: Base Operations Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

Date: February 1994

(U) Related Activities:
- (U) PE0605807F, Test and Evaluation Support (TES), provides the mission funds for civilian personnel at Arnold AFB since mission support consumes almost all personnel efforts.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

2. (U) 6606CE, Other Support: Provides resources for fundamental civil engineering services such as custodial, fire protection, hazardous material systems certification, refuse collection, insect and pest control, rentals and leases, architectural and engineering design, grounds maintenance as well as civil engineering administrative costs, including equipment, supplies, temporary duty and civilian pay.

(U) FY 1993 Accomplishments:
- (U) Financed civilian positions located in command and staff organizations and civil engineering operations and utilities. It included regular salary and wages, additional compensation for overtime pay, personnel benefits such as allowances to employees, and payments to the retirement funds. ($6.8M)
- (U) Paid for base custodial services such as office cleaning, vacuuming, dusting and trash collection, which included administrative, laboratory, testing, and common use buildings. ($3.5M)
- (U) Financed services to perform studies and design technical projects requiring specific areas of expertise either to supplement the existing design work force or to provide new technical design based on areas not normally provided by base engineers. Also financed contracts that included refuse collection and fire prevention systems. ($3.2M)
- (U) Financed essential supplies for mission operations, bench stock bulk issues, and miscellaneous building materials. ($3.7M)
- (U) Financed replacement of mission essential equipment. ($0.5M)

(U) FY 1994 Plans:
- (U) Civilian positions. ($6.9M)
- (U) Custodial services. ($3.6M)
- (U) Refuse collection, systems inspection and certification, sanitation and utility operations and fire protection. ($4.1M)
- (U) General supplies and miscellaneous building materials. ($4.8M)
- (U) Replacement of mission essential equipment. ($1.7M)

Program Element: #0605896F
PE Title: Base Operations Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

Date: February 1994

(U) FY1995 Plans:
- (U) Civilian positions. ($7.0M)
- (U) Custodial services. ($3.7M)
- (U) Refuse collection, systems inspection and certification, sanitation and utility operations and fire protection. ($4.1M)
- (U) General supplies and miscellaneous building materials. ($4.1M)
- (U) Replacement of mission essential equipment. ($1.7M)

(U) Work Performed By: In-house work force; Litton Food Management Service, PA; Delta Patrol Services, CA; Cal Disposal, CA; Madison Services, MI; Management Technical Services, CA; Environmental Waste, FL; SSI Services, Inc., TN; Sverdrup Technology Inc, MO; Cal Span Corp., OH; and General Physics, MD.

(U) Related Activities:
- (U) PE0605807F, Test and Evaluation Support (TES), provides the mission funds for civilian personnel at Arnold AFB since mission support consumes almost all personnel efforts.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

3. (U) Project 6606UT, Operations of Utilities: Finances purchase of utilities (electricity, natural gas, water and sewage treatment), base operation of water and sewage treatment plants and distribution systems. Amounts of utilities consumed and waste processed for discharge exceed those of other operating bases due to unique test mission.

(U) FY 1993 Accomplishments:
- (U) Financed the purchase of water, distillates electricity, gas and cable television service. ($21.3M)
- (U) Funded payroll. ($1.5M)
- (U) Purchase equipment. ($0.1M)
- (U) Provided equipment maintenance. ($0.1M)
- (U) Purchased general supplies for plant operations. ($1.0M)

Program Element: #0605896F
PE Title: Base Operations Support
Budget Activity: #6 - RDT&E Management Support
Old Budget Activity: #6-Defense-Wide Mission Support

Date: February 1994

(U) FY1994 Plans:
- (U) Purchases water, distillates, electricity, gas and cable television service. ($21.6M)
- (U) Civilian payroll. ($1.6M)
- (U) General supplies for plant operations. ($1.0M)
- (U) Purchase and maintenance of equipment . ($0.3M)

(U) FY 1995 Plans:
- (U) Water, distillates, electricity, gas and cable television service. ($22.5M)
- (U) Civilian payroll. ($1.7M)
- (U) General supplies for plant operations. ($1.0M)
- (U) Purchase and maintenance of equipment. ($0.3M)

(U) Work Performed By: In-house work force; Southern California Edison, CA; Pacific Gas and Electric, CA; Florida Power & Light, FL; Gulf Power, FL; Cal Disposal, CA; Western Area Power Administration.

(U) Related Activities:
- (U) PE0605807F, Test and Evaluation Support (TES), provides the mission funds for civilian personnel at Arnold AFB since mission support consumes almost all personnel efforts.
- (U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0702207F
PE Title: Depot Maintenance
Budget Activity: #7, Operational Systems Development
Old Budget Activity: #6, Defense Wide Mission

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
673326, Precision Measurement & Calibration Equipment Development (PMCED)								
2729	1820	2099	2102	2153	2236	2327	Continue	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program develops, tests, and evaluates measurement standards and associated equipment for 182 base precision measurement equipment laboratories (PMEL) worldwide. The technology of modern weapons systems require continuing research and development of calibration equipment to ensure aerospace equipment meets Air Force readiness objectives. This program is performed under the Operational Systems Development category of research.

C. (U) JUSTIFICATION FOR SINGLE PROJECTS LESS THAN $10.0 MILLION IN FY 1995:

(U) 673326, PMCED: Designed to develop, test, and evaluate standards and associated equipment used in the measurement and calibration of advanced weapons systems and support equipment. Includes such high technology as lasers, microwave, millimeter wave, electro-optical, and automated test equipment. Work supports the overall advancement of national technology.

(U) FY 1993 Accomplishments

- (U) - Completed a method to calculate diffraction losses to improve missile tracking. ($50K)
- (U) - Continued development in electro-optical and IR radiometer standards and measurement capabilities for radar low observables and weapon system tracking. ($1170K)
- (U) - Continued improvements in quality and reliability development in standards and measurement capabilities for radar and communication systems. ($719K)
- (U) - Continued development of improved measurement traceability for radar antenna systems. ($260K)
- (U) - Completed dimensional analysis and artifact testing and continued methodology development of coordinate measuring machines (CMMs) used for depot support equipment calibration. ($150K)
- (U) - Initiated force effects analysis of high performance aircraft joints and fasteners. ($150K)
- (U) - Began improved measurement methodology development for radar support instruments in providing traceability to DOD. ($130K)
- (U) - Began development work to support propulsion system vibration monitoring instrumentation. ($100K)

Program Element: #0702207F
PE Title: Depot Maintenance
Budget Activity: #7, Operational Systems Development
Old Budget Activity: #6, Defense Wide Mission

Date: February 1994

(U) FY 1994 Plans:
- (U) - Complete development of IR standards for improved low observables measurement capability. ($325K)
- (U) - Continue development of standards and measurement capabilities to support weapon system tracking and communication systems. ($375K)
- (U) - Continue improvements in measurement capabilities to support low radar observables and continue improving the quality and reliability of radar and communications systems. ($445K)
- (U) - Continue development of efficient calibration methodologies for CMMs used in calibration of support equipment. ($150K)
- (U) - Continue force effects analysis of high performance aircraft joints and fasteners. ($50K)
- (U) - Continue development of standards and measurements for radar support instruments to provide traceability to DOD. ($325K)
- (U) - Continue work for propulsion system vibration monitoring instrumentation. ($100K)
- (U) - Begin development work to support radiation hazard instrumentation. ($50K)

(U) FY 1995 Plans:
- (U) - Continue development of improved standards and methods to support low observables and weapon tracking systems. ($825K)
- (U) - Complete development of measurement capabilities to support low radar observables and continue improving the quality and reliability of radar and communications systems. ($225K)
- (U) - Continue development of efficient calibration methodologies for CMMs used in calibration of support equipment. ($200K)
- (U) - Continue force effects analysis of high performance aircraft joints and fasteners. ($100K)
- (U) - Continue development of standards and measurements for radar support instruments to provide traceability to DOD. ($150K)
- (U) - Complete development work to support propulsion system vibration monitoring instrumentation. ($100K)
- (U) - Continue development work to support radiation hazard instrumentation. ($100K)
- (U) - Begin development of power standards for RF communication and radar systems. ($275K)
- (U) - Begin model development to improve standards accuracy and reliability. ($124K)

(U) Work Performed By: Most of the work is performed by the National Institute of Standards and Technology (NIST). The remainder being performed by private industry, universities/non-profit institutions, and the Air Force Directorate of Metrology.

(U) Related Activities:
(U) Activity is directed by the Joint Logistics Commanders Technical Coordinating Group for Metrology and Calibration. Results of these projects contribute to the technological advancement of industry through regular calibration services.
(U) NIST uses some in-house funds to advance these areas.
(U) Projects are coordinated with the Army and Navy metrology R&D programs who fund other developments.
(U) There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriated Funds: Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Date: February 1994

Program Element: #0708012F
PE Title: Logistic Support Activities
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #6 - Defense-Wide Mission Support

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

	FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
3090 Embedded Computer Resources Support Improvement Program (ESIP)	4,604	5,007	4,585	4,743	4,513	4,780	5,134	Cont	TBD
3317 Air Force Digital Specifications and Standards	1,207	1,294	1,219	1,259	1,174	1,127	1,016	Cont	TBD
Total	5,811	6,301	5,804	6,002	5,687	5,907	6,150	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program funds the growing need for research and development of support issues related to the increasing reliance on computer resources. New software design techniques, software support tools, environments, and processes; and standards for digital documentation will result from this program. Functions formerly accomplished in hardware have been assumed by software, and software which can be changed to meet new and different threats and missions is critical to the ability of the Air Force to be responsive to world situations.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1994:

(U) Project Number, Project Title: 3090, ESIP. This project conducts research to improve support of embedded computer system software. It encompasses automation and standardization of support processes, advanced support methodologies, tools and environments, and readiness support to facilitate rapid turnaround of software in response to changing mission and/or changing threat requirements.

Program Element: #0708012F
PE Title: Logistic Support Activities
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) - Demonstrated hypermedia technology to automate software documentation and use on E-3A maintenance manuals (50K).
- (U) - Integrated Ada tools into advanced support environment (ASE) (300K).
- (U) - Demonstrated automatic test generation techniques in the ASE (823K).
- (U) - Demonstrated prototype virtual simulator for specific applications (1089K).
- (U) - Pursued hardware stimulators/emulators for test environment (500K)
- (U) - Assess requirements for smart software instrumentation to collect anomaly data to reduce software correction time (1295K).
- (U) - Demonstrate fault tolerant techniques to improve weapon delivery under corrupted data situations(97K).
- (U) - Completed FORTRAN to Ada reengineering process concept definition report (300K).
- (U) - Explored object-oriented techniques (150K).

(U) FY 1994 Plans:
- (U) - Initiate advanced avionics instrumentation and sensor control capability for capturing software anomalies in flight (12K).
- (U) - Test data instrumentation collection prototype on F-15 test aircraft (625K).
- (U) - Demonstrate avionics visualization concepts to improve data analysis and reduction to identify and correct anomalies (704K).
- (U) - Continue development of prototype virtual simulator (2096K).
- (U) - End preliminary work to use hypermedia on technical manuals (500K).
- (U) - Demonstrate automated verification and validation test case generation and begin evaluation within an ASE (1070K).

(U) FY 1995 Plans:
- (U) - Demonstrate hypermedia-based Integrated Product Development (IPD) (400K).
- (U) - Complete adaptive software support study (145K).
- (U) - Demonstrate virtual node software (350K).
- (U) - Develop prototype capability for quick/detailed analysis of data from different avionics sources (700K).
- (U) - Define system monitor and interactive processor architecture for advanced avionics instrumentation (700K).
- (U) - Demonstrate virtual simulator concept (2290K).

(U) Work Performed by: In-house work is done by Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are Science Applications International Corporation (SAIC), Panama City, FL; The Analytical Science Corporation (TASC), Reading, MA; Hughes, El Segundo, CA; TRW, Dayton, CH; and Westinghouse, Baltimore, MD.

(U) Related Activities: None. There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable

Program Element: #0708012F
PE Title: Logistic Support Activities
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) International Cooperative Agreements: Not Applicable

(U) Project Number, Project Title: 3317, Air Force Digital Specifications and Standards. This project conducts research leading to the development and updating of digital standards. These standards are required to implement the Computer-aided Acquisition and Logistics Support (CALS) concept.

(U) FY 1993 Accomplishments:
- (U) - Proof of concept for the CALS library and database to DISA for DoD-wide use (300K).
- (U) - Published MIL-STD-1840B, MIL-M-28001B, MIL-R-28002B, and MIL-D-28003A (470K).
- (U) - Developed drafts of MIL-HDBK-59B and Standard Generation Markup Language handbook (200K).
- (U) - Published CALS standards management plan (125K).
- (U) - Published MIL-STD-974, *Contractor Integrated Technical Integration Services* (112K).

(U) FY 1994 Plans:
- (U) - Publish final MIL-HDBK 59B (40K).
- (U) - Support development of document type definitions under technical manual specifications and standards (370K).
- (U) - Support development of format output specification standards development (556K).
- (U) - Survey need for digital engineering and manufacturing (E&M) data/drawings (85K).
- (U) - Examine process improvement opportunities from digital E&M data acquisition (85K).
- (U) - Represent AF needs at national and international standards activities (158K).

(U) FY 1995 Plans:
- (U) - Determine specifications and standards needed for digital E&M data delivery (116K).
- (U) - Begin developing E&M specifications and standards (933K).
- (U) - Represent AF needs at national and international standards activities (170K).

(U) Work Performed By: In-house work is done by the CALS Program Office, Electronic Systems Center, Wright-Patterson AFB, OH. The contractor is Maxima Corp., Beavercreek OH.

(U) Related Activities: None. There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Date: February 1994

Program Element: #0708012F
PE Title: Logistic Support Activities
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #6 - Defense-Wide Mission Support

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

	FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
3090 Embedded Computer Resources Support Improvement Program (ESIP)	4,604	5,007	4,585	4,743	4,513	4,780	5,134	Cont	TBD
3317 Air Force Digital Specifications and Standards	1,207	1,294	1,219	1,259	1,174	1,127	1,016	Cont	TBD
Total	5,811	6,301	5,804	6,002	5,687	5,907	6,150	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program funds the growing need for research and development of support issues related to the increasing reliance on computer resources. New software design techniques, software support tools, environments, and processes; and standards for digital documentation will result from this program. Functions formerly accomplished in hardware have been assumed by software, and software which can be changed to meet new and different threats and missions is critical to the ability of the Air Force to be responsive to world situations.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1994:

(U) Project Number, Project Title: 3090, ESIP. This project conducts research to improve support of embedded computer system software. It encompasses automation and standardization of support processes, advanced support methodologies, tools and environments, and readiness support to facilitate rapid turnaround of software in response to changing mission and/or changing threat requirements.

Program Element: #0708012F
PE Title: Logistic Support Activities
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) FY 1993 Accomplishments:
- (U) - Demonstrated hypermedia technology to automate software documentation and use on E-3A maintenance manuals (50K).
- (U) - Integrated Ada tools into advanced support environment (ASE) (300K).
- (U) - Demonstrated automatic test generation techniques in the ASE (823K).
- (U) - Demonstrated prototype virtual simulator for specific applications (1089K).
- (U) - Pursued hardware stimulators/emulators for test environment (500K)
- (U) - Assess requirements for smart software instrumentation to collect anomaly data to reduce software correction time (1295K).
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(U) FY 1995 Plans:
- (U) - Demonstrate hypermedia-based Integrated Product Development (IPD) (400K).
- (U) - Complete adaptive software support study (145K).
- (U) - Demonstrate virtual node software (350K).
- (U) - Develop prototype capability for quick/detailed analysis of data from different avionics sources (700K).
- (U) - Define system monitor and interactive processor architecture for advanced avionics instrumentation (700K).
- (U) - Demonstrate virtual simulator concept (2290K).

(U) Work Performed By: In-house work is done by Wright Laboratory, Wright-Patterson AFB, OH. The top five contractors are Science Applications International Corporation (SAIC), Panama City, FL; The Analytical Science Corporation (TASC), Reading, MA; Hughes, El Segundo, CA; TRW, Dayton, OH; and Westinghouse, Baltimore, MD.

(U) Related Activities: None. There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable

Program Element: #0708012F
PE Title: Logistic Support Activities
Budget Activity: #7 - Operational Systems Development
Old Budget Activity: #6 - Defense-Wide Mission Support

Date: February 1994

(U) International Cooperative Agreements: Not Applicable

(U) Project Number, Project Title: 3317, *Air Force Digital Specifications and Standards. This project conducts research leading to the development and updating of digital standards. These standards are required to implement the Computer-aided Acquisition and Logistics Support (CALS) concept.*

(U) FY 1993 Accomplishments:
- (U) - Proof of concept for the CALS library and database to DISA for DoD-wide use (300K).
- (U) - Published MIL-STD-1840B, MIL-M-28001B, MIL-R-28002B, and MIL-D-28003A (470K).
- (U) - Developed drafts of MIL-HDBK-59B and Standard Generation Markup Language handbook (200K).
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- (U) - Published MIL-STD-974, Contractor Integrated Technical Integration Services (112K).

(U) FY 1994 Plans:
- (U) - Publish final MIL-HDBK 59B (40K).
- (U) - Support development of document type definitions under technical manual specifications and standards (370K).
- (U) - Support development of format output specification standards development (556K).
- (U) - Survey need for digital engineering and manufacturing (E&M) data/drawings (85K).
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- (U) - Represent AF needs at national and international standards activities (158K).

(U) FY 1995 Plans:
- (U) - Determine specifications and standards needed for digital E&M data delivery (116K).
- (U) - Begin developing E&M specifications and standards (933K).
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(U) Work Performed By: In-house work is done by the CALS Program Office, Electronic Systems Center, Wright-Patterson AFB, OH. The contractor is Maxima Corp., Beavercreek OH.

(U) Related Activities: None. There is no unnecessary duplication of effort within the Air Force or Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0708026F
Date: February 1994
PE Title: Productivity, Reliability, Availability, Maintainability (PRAM)
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #6 Defense Wide Mission Support

A. (U) RESOURCES ($ in Thousands)

	FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
672146, Productivity, Reliability, Availability, Maintainability (PRAM)									
	22,307	18,068	6,785	6,881	6,705	7,005	7,348	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: PRAM was initiated in 1975 by the AF Chief of Staff to: reduce current and potential operations and support costs; to improve the effectiveness of Air Force operational systems, subsystems, and equipment by providing "front end" investments for the adaptation and prototyping of off-the-shelf technology; and to promote the tenets of the USAF R&M 2000 process. PRAM, a level-of-effort program, has 106 active projects with a proven return-on-investment of 16 to 1. Average project length is twenty-seven months. The success of PRAM projects are dependent upon MAJCOMS and field support to adapt technology once the initial investment is completed. Listed below are projects being pursued as identified by Air Force Materiel Command (AFMC) Technology Master Process (TMP). The objective of the TMP is to strategically focus technology application/insertion for the Air Force's future needs. The category of research being performed in this PE is Operational Systems Development because projects are being engineered for service use.

Program Element: #0708026E **Date:** February 1994
PE Title: Productivity, Reliability, Availability, Maintainability (PRAM)
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #6-Defense Wide Mission Support

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) FY 1993 Accomplishments:
(U) - Continued activity to design, prototype, and certify a new lightweight Kevlar material restraint device and utility loop to replace existing tiedown devices and associated chains for military cargo aircraft ($0.300)
(U) - F-15 Stick Force Sensor (SFS) - Completed effort to modify SFS on the F-15E aircraft. Also to be applied to the F-15A-D models. Implementation will be via preferred spares ($0.609)
(U) - Awarded contracts to initiate several projects including C-130 air refueling, high power wave tube test stand, robotic deriveter, detection of hidden corrosion, airdraft transparency repair and development of titanium casting ($10.434)
(U) - Completed preliminary design for paint reflectometer, electromagnetic thickness gauge and mated connector ($0.550)
(U) - Completed manufacturing analysis for repair technology for CRT displays ($0.690)
(U) - Completed prototypes for B-52 IR Camera, Neural Radiant Energy Detection System, and QRC 84-02A, transponder group integration and planning, repair and execution system ($5,600)
(U) - Developed prototypes for Sixport Waveguide Switch, turboshaft engine test cell and Air Navigator Multiple Indicator ($1,400)
(U) - Completed software development for reverse engineering, and automated X-ray inspection ($0.460)
(U) - Completed preliminary design for Brake Housing, Fiber Optic Intercom, and Compression/Turbine Balancing ($0.464)
(U) - Incremental funding provided for the continuation of prior year activities ($1,500)

(U) FY 1994 Plans:
(U) - Complete work on the C-130 Air Refueling Improvement ($0.210)
(U) - Begin development, modification, prototype and test for a more reliable, rugged, man-portable mini-zone marker, structural efficiency of fighter aircraft doors and solid state highly reliable accelerometer ($1,700).
(U) - Complete Multiplace Vacuum-Packed Life Raft project effort to validate the use of a low cost, highly reliable life raft for multicrew or passenger carrying aircraft flying over water ($0.220M).
(U) - Initiate development of Cryogenic Foil-Bearing Turbopump and Portable Line Replaceable Unit (LRU) Cannot Duplicate Test System ($0.500).

Program Element: #0708026E **Date:** February 1994
PE Title: Productivity, Reliability, Availability, Maintainability (PRAM)
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #6-Defense Wide Mission Support

(U) - Complete test and manufacturing for Fatigue Resistant Bulkheads ($1,500).
(U) - Complete inlet rain corrosion tape project ($0.130)
(U) - Complete the integrated product development acquisition tools project ($0.533)
(U) - Start the reusable software for spacecraft project ($0.530)
(U) - Perform the SDR and PDR on the fiber optic, low accuracy, vertically referenced attitude sensor ($0.600)
(U) - Start the advanced magnetic azimuth detector, a form-fit-function replacement for the current magnetic azimuth detector fitted to the KC-135, C-130, F-15, and the B-1B. A ten-fold increase in reliability is expected ($1,100)
(U) - Perform the PDR, CDR, and complete the design on the compressor blade monitor system. ($0.495)
(U) - Incremental funding will be provided for the continuation of activities begun in prior years. ($10,550)

(U) FY 1995 Plans:
(U) - Complete work on B-1B Oxygen Analyzer, Low cost Titanium Casting, Automated Vehicle Data Acquisition, Miniature RF Blind-mated Connector, Repair Technologies for CRT High Voltage Power Supply, Electronic Board and Tester Simulation Software, Fatigue Resistant Bulkheads, Compressor Blade Monitor, Mini Zone Marker, Improved Fighter Aircraft Doors, and Solid State Accelerometer. ($4,200)
(U) - Continue incremental funding on Nickel-hydrogen Battery, Reusable Software for Spacecraft, Combustor Rework Cell, and Fiber Optic Attitude Sensor. ($2,500)
(U) - Given funding required for continuation of on-going projects, it is highly unlikely any new projects will be intiated during FY95. However, the TMP will review needs and funding during 2nd Qtr FY94 to consider future projects. The TMP will identify projects most in need of funding with the highest payback in terms of operational capability, reliability and maintainability improvement, and cost. Program will re-baseline with reduced funding.

(U) Work Performed By: The PRAM Program Office is a division of the Technology Transition Office located at Wright-Patterson AFB, OH. Other organizations involved are HQ USAF, HQ AFMC, product centers, test centers, air logistics centers and laboratories. The five largest participating contractors are McDonnell-Douglas, St. Louis, MO; Garret Fluid Systems Division, Tempe, AZ; Northrop Corp., Rolling Meadows, IL; AAI Corp., Hunt Valley, MD; and Bendix Wheels/Brakes, South Bend, IN. There are 63 other contractors.

Program Element: #0708026F
PE Title: Productivity, Reliability, Availability, Maintainability (PRAM)
Budget Activity: #7 Operational Systems Development
Old Budget Activity: #6-Defense Wide Mission Support

Date: February 1994

(U) Related Activities:
(U) - PRAM works in a complimentary role with the Reliability and Maintainability Technology Insertion Program (RAMTIP), PE 0604609F; the Fastener, Actuator, Connector, Tool, and Subsystems program (FACTS), PE 0708004F, and the Aircraft Engine Component Improvement Program (CIP), PE 0604268F as it relates to reliability and maintainability improvements in operational engines.
(U) - All PRAM projects are closely coordinated with the AF laboratories to preclude duplication of effort and to take advantage of technology advances emanating from the laboratory environment.
(U) - All PRAM projects are reviewed for potential Army/Navy interest, and dialogue is established in cases where commonality of problems exist such that solutions become DoD-wide.
(U) - There is no duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ In Thousands): Not Applicable.

(U) International Cooperative Agreements: Not Applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: #0708054F
PE Title: Pollution Prevention
Budget Activity: #7-Operational Systems Development
Old Budget Activity: #6-Defensewide Mission Support

Date: February 1994

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

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
0	25087	16216	21616	12768	5798	5505	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program funds all costs associated with pollution prevention including the qualification of environmentally acceptable materials and processes to replace existing common hazardous materials and processes in weapon systems, support systems, and facilities. Also funds all pollution prevention efforts required to accomplish the objectives and subobjectives of the Air Force Pollution Prevention Action Plan which includes eliminating the use of ozone depleting chemicals; reducing the generation of solid waste, hazardous waste, air emissions and wastewater; and establishing recycling programs at the Research and Development Activities Installations (Eglin, Arnold and Edwards AFBs). If not supported, the Air Force will not be in compliance with our treaty obligations in the Montreal Protocol or Executive Order 12856 and will continue to be responsible for escalating waste disposal quantities and costs and increased legal liabilities. PP's efforts support programs which will replace or upgrade weapon systems, support systems, and infrastructure.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

(U) FY 1993 Accomplishments:
- (U) - Not Applicable.

(U) FY 1994 Plans:
- (U) - First year of new start program.
- (U) - Funding of Eglin, Arnold and Edwards AFBs pollution prevention O&M requirements to include solid waste recycling, hazardous waste minimization and hazardous material management ($3,662K).

Program Element: #0708054F
PE Title: Pollution Prevention
Budget Activity: #7-Operational Systems Development
Old Budget Activity: #6-Defensewide Mission Support

Date: February 1994

(U) - Qualification of commercially available material, equipment and processes to support the elimination of ozone depleting chemical use by the Air Force and implmentation of the Air Force Pollution Prevention Action Plan objectives and subobjectives ($16,025K).

(U) - Implementation of Executive Order 12856 requirement to review all Military Standards, Specifications and Technical Orders to identify the uses of hazardous materials and processes that generate hazardous waste by the end of 1995 and identify new materials or processes that are environmentally sound by the end of 1999 ($5400K).

(U) FY 1995 Plans:

(U) - Funding of Eglin, Arnold and Edwards AFBs pollution prevention O&M requirements to include solid waste recycling, hazardous waste minimization and hazardous material management ($2553K).

(U) - Continued qualification of commercially available material, equipment and processes to support the Montreal Protocol, and Action Plan objectives and subojectives ($10773K).

(U) - Continued implementation of Executive Order 12856 requirement to review all Military Standards, Specifications and Technical Orders to identify the uses of hazardous materials and processes that generate hazardous waste by the end of 1995 and identify new materials or processes that are environmentally sound by the end of 1999 ($2890K).

(U) WORK PERFORMED BY: Contract use is at the discretion of the executing Commands. The primary Command for this requirement will be the Air Force Material Command.

(U) RELATED ACTIVITIES:

(U) - Program Element 0604708F, Civil Engineering/Aircraft Support Equipment

(U) - There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

Program Element: #0708054F
PE Title: Pollution Prevention
Budget Activity: #7-Operational Systems Development
Old Budget Activity: #6-Defensewide Mission Support

Date: February 1994

(U) OTHER APPROPRIATION FUNDS ($ In Thousands):

(U) Operations and Maintenance

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
0	24254	83097	37740	32564	38628	41976	Cont	TBD

(U) Other Procurement (Other Base Maintenance and Support Equip)

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
0	38219	23553	9339	12614	11395	3669	Cont	TBD

(U) Aircraft Procurement

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
0	8152	8842	6639	7127	1710	1918	Cont	TBD

(U) Missile Procurement

FY93 Actual	FY94 Est	FY95 Est	FY96 Est	FY97 Est	FY98 Est	FY99 Est	To Complete	Total Program
0	1325	0	0	0	0	0	Cont	TBD

(U) INTERNATIONAL COOPERATIVE AGREEMENTS:

The Montreal Protocol on Substances that Deplete the Ozone Layer was ratified by the Senate in 1988 and entered into force on 1 January 1989. The agreement eliminates the production and consumption of substances that deplete the ozone layer by the end of 1995. This PE provides the funding for this phaseout requirement.

Program Element: #0708054F
PE Title: Pollution Prevention
Budget Activity: #7-Operational Systems Development
Old Budget Activity: #6-Defensewide Mission Support

Date: February 1994

(U) MILESTONE SCHEDULE:

1. Institutionalize PP in Systems Acquisition - Dec 1994
2. Institutionalize PP in Hazardous Materials - Dec 1994
   Minimization and Management in Maintenance
   and Modification Processes
3. Eliminate the purchase of all ODC solvents, - Dec 1994
   and equipment/systems/products requiring ODCs
4. Review 25% of TOs, MILSPECS and MILSTDS - Dec 1995

FY 1995 RDT&E D: SCRIPTIVE SUMMARY

Program Element: #0804734F
PE Title: CRYPTO/SIGINT Related Skill Training
Budget Activity: 7. Operational Systems Development
Old Budget Activity: 6. Defense-wide Mission Support

Date: February 1994

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
1005 SENTINEL BRIGHT Phase II/SENTINEL II								
0*	1915	1526	1146	1695	1506	0	0	8058

*** Not a new start -- FY93 & prior funded in Other Procurement APPN.**

B. (U) BRIEF DESCRIPTION OF ELEMENT: The initial submission of this Descriptive Summary was in the FY94 PB and reflected the zero-base transfer of APPN 3080 funding to APPN 3600 funding to support completion of the SENTINEL BRIGHT Phase II (SB II)/SENTINEL II (S II) software development/integration, since all hardware was procured prior to FY93. This requirement supports the demonstration and validation category (6.3B). The SENTINEL systems encompass the development and acquisition of computer aided/computer managed instruction (CAI/CMI) to modernize training for Air Force and DoD intelligence specialists. SB II specifically supports training of cryptologic analysts and maintenance personnel. SENTINEL ASPEN Phase II (SA II) supports training for general military intelligence analysts. S II is the integration of SB II and SA II with common software on like hardware. The overall SENTINEL program will substantially contribute to the preparation of intelligence technicians to meet requirements of the next century. The program will parallel the fielding of modernized operational intelligence systems and correct long-standing deficiencies in training capabilities of the intelligence community.

Program Element: #0804734F
PE Title: CRYPTO/SIGINT Related Skill Training
Budget Activity: 7. Operation Systems Development
Old Budget Activity: 6. Defense-wide Mission Support

Date: February 1994

Background: American Systems Corp. (ASC), the initial SB II prime contractor, experienced financial difficulties beginning in 1990 severely threatening the completion of SB II. Conditions worsened in May 1991, when ASC's bank demanded it decrease its debt level. A Program Office audit revealed ASC was on the verge of bankruptcy and suggested a buy-out be initiated. As a result of the buy-out (completed in Jul 91), the government received 310 complete workstations, 60 percent finished software (delivered "as is" without documentation), design rights, and critical subcontractor proprietary agreements. Additionally, the contractor dropped all claims against the government. Because of this unique problem, it was essential a new SB II contract be let to complete the software design and coding. The new SB II/S II contract was awarded in Mar 93. SB guidance documents are ATC SON 05-78 (Revised) and AF PMD 0110, as amended.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) 1005, SENTINEL BRIGHT Phase II/S II: The SB II/SII training systems provide cryptologic/SIGINT related skills emulative training to fulfill the requirement for operationally trained intelligence personnel in the field.

(U) FY93 Accomplishments: N/A

(U) FY94 Plans:

(U) - Courseware Development	(174K)
(U) - Program Office	(277K)

(U) FY95 Plans:

(U) - Courseware Development	(200K)
(U) - Mitre Support	(1204K)*
(U) - Software Integration	(500K)
(U) - Program Office	(300K)

* - Reflects use of FY94 funding to complete plans.

Program Element: #0804734F **Date:** February 1994
PE Title: CRYPTO/SIGINT Related Skill Training
Budget Activity: 7. Operation Systems Development
Old Budget Activity: 6. Defense-wide Mission ..upport

(U) Work Performed By:

(U) The prime contractor is Engineering Research Associates (ERA) of Vienna, Virginia. HQ Electronic Systems Center is the System Program Office (SPO) and is supported by MITRE Corp as the IV&V contractor.

(U) Related Activities:

(U) - Program Element 35885G, Tactical Crypto Program

(U) - The National Security Agency provides additional RDT&E funding to the Air Force which is the Executive Agent for training Cryptologic Intelligence personnel. This funding is essential to completion of the SB II/S II cryptologic training systems.

(U) - There is no unnecessary duplication of effort within the Air Force and the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
Other Procurement, Budget Activity 832061, Program Title SENTINEL BRIGHT Phase II/SENTINEL II								
3820	31	148	283	0	0	2614	0	4869

(U) International Cooperative Agreements: N/A

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Program Element: 0901218F
PE Title: Civilian Compensation Program
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 6-Defensewide Mission Support

DATE: FEBRUARY 1994

A: (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
5,135	5,775	5,817	6,166	6,593	6,957	7,374	Cont'd	Cont'd

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element provides funds for payment of civilian compensation benefits for disability due to personal injury sustained while in the performance of duty or due to employment-related disease according to the Federal Employees' Compensation Act (FECA) under Title 5 U.S.C. Chapter 81. The Department of Labor administers this program and charges the Department of the Air Force for its employee costs. This PE excludes manpower authorizations and costs.

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 1995:

1. (U) Project 4139, Civilian Compensation Program:

(U) FY 1993 Accomplishments:
(U) - $5,135 million cited above funded disability compensation of personnel assigned to RDT&E activities for injuries and/or illnesses in the performance of duties or due to employment related disease.

Program Element: 0901218F
PE Title: Civilian Compensation Program
Budget Activity: 7-Operational Systems Dev
Old Budget Activity: 6-Defensewide Mission Support

DATE: FEBRUARY 1994

(U) FY 1994 Plans:
(U) - $5,775 million requested to continue a level of effort program and is based on bills already received to compensate employees assigned to RDT&E facilities for work-related injury or disease.

(U) FY 1995 Plans:
(U) - $5,817 million requested to continue a level of effort program and is based on bills already received to compensate employees assigned to RDT&E facilities for work-related injury or disease.

(U) Work Performed By: Private civilian health care providers including hospitals, physicians, and contractors providing nursing services, rehabilitation services, prosthetic appliances, and burial services. Bills for the Department of the Air Force for the total cost of benefits and other payments made on account of the injury or death of employees or individuals under the jurisdiction of their agency.

(U) Related Activities: Not applicable.

(U) Other Appropriation Funds ($ in Thousands): The Air Force O&M appropriation provides disability compensation for civilian employees assigned to activities other than RDT&E.

(U) International Cooperative Agreements: Not applicable.

FY 1995 RDT&E DESCRIPTIVE SUMMARY

Date: February 1994

Program Element: #1001004F
PE Title: International Activities
Budget Activity: #7- Operational System Development
Old Budget Activity: #6 - Defense Wide Mission Support

A. (U) RESOURCES ($ in Thousands)

FY93 Actual	FY94 Estimate	FY95 Estimate	FY96 Estimate	FY97 Estimate	FY98 Estimate	FY99 Estimate	To Complete	Total Program
6600AH	SHAPE Technical Centre, Von Karman Institute, AGARD, ICRD&A Support							
3,522	1,909	3,436	3,339	3,378	3,504	3,644	Cont	TBD

B. (U) BRIEF DESCRIPTION OF ELEMENT: This program element satisfies the USAF role as the Department of Defense (DOD) Executive Agent for three international organizations and its responsibilities for international cooperative research, development, and acquisition, to include: 1) US national support to the North Atlantic Treaty Organization (NATO) Supreme Headquarters Allied Powers Europe (SHAPE) Technical Centre (STC) in The Netherlands; 2) US national contributions to the Von Karman Institute (VKI) in Belgium; 3) US national participation in and support of the NATO Advisory Group for Aerospace Research and Development (AGARD) headquartered in France; 4) USAF participation in the Engineer and Scientist Exchange Program (ESEP); and 5) USAF commitments to all aspects of International Cooperative Research, Development and Acquisition (ICRD&A) including cooperative opportunity assessments and participation in bilateral and multilateral cooperative research and development councils. When the budget activities were realigned, our previous budget activity changed from 6.6-Defense Wide Mission Support, to 7-Operations System Development. However, our activities provide management and support for ICRD&A between USAF laboratories and R&D product centers with foreign laboratories and acquisition agencies, and should be in budget activity 6. This program element satisfies DOD and USAF commitments to our major alliance partners.

Date: February 1994

Program Element: #1001004F
PE Title: International Activities
Budget Activity: #7 - Operational System Development
Old Budget Activity: #6 - Defense Wide Mission Support

C. (U) JUSTIFICATION FOR PROJECTS LESS THAN $10 MILLION IN FY 95:

(U) Project #6600AH: SHAPE, STC, VKI, AGARD, ICRD&A: DOD Regulation 2010.1 designates the USAF as the Executive Agent for managing US support to AGARD, VKI and STC. The USAF ICRD&A program supports these NATO activities and other USAF international cooperative weapons research and development ventures. ICRD&A reduces USAF R&D costs by spreading expenses among international partners and by increasing production quantities to reduce unit costs. Ancillary benefits include increased interoperability and standardization with our international partners. STC - The STC promotes NATO security through the development of interoperable command and control systems. Through the US R&D Coordination Office, the USAF supports eight DOD scientists/engineers assigned to the STC and fulfills a US commitment for collective defense. VKI - The Von Karman Institute, founded by AGARD, is an international research facility using world-class deicing and shock tunnel facilities that specializes in computational fluid dynamics. VKI research contributes to knowledge of aircraft deicing effects, spacecraft boundary layer problems, and the environmental effects of fluid motion providing significant benefits to the DOD, NASA, and US industry, as well as, enhancing DOD dual-use technology initiatives. AGARD - AGARD is an agency under the NATO Military Committee for the purpose of providing it with aerospace research and development advice and technical assistance. AGARD research provides direct benefits to the US, JCS, and military services in such areas as advanced propulsion, sensor operations, human factors, guidance and control problems, theater missile defense, inter/intra-theater air mobility, theater air defense, and aircraft protection. As executive agent, the USAF funds the US share of management, administrative and travel costs to continue these AGARD projects. ICRD&A - Funds all aspects of negotiating, implementing and executing ICRD&A agreements. This includes support to the Conference of National Armaments Directors (CNAD), NATO Air Force Armaments Group (NAFAG), and Four-Power Air Senior National Representatives (ASNR) Council activities and initiatives designed to develop and enact international cooperative weapons research and development programs. These exchanges provide a forum for harmonizing requirements, assessing cooperative opportunities, and promoting US exports. Also included is support for DOD initiatives to acquire technology from Former Soviet Union (FSU) research centers to establish long-term scientific relationships and support FSU stability. These activities leverage US and allied R&D resources, gain US access to allied technological strengths, enhance coalition interoperability and support the US industrial base.

Date: February 1994

Program Element: #1001004F
PE Title: International Activities
Budget Activity: #7 - Operational System Development
Old Budget Activity: #6 - Defense Wide Mission Support

(U) FY 1993 Accomplishments:

- (U)- STC - Fulfilled US commitments with a fully staffed US R&D Coordination Office, supported eight US scientists and engineers assigned to the STC, and provided liaison services between US government agencies and the STC ($200K).
- (U)- VKI - Funded US share of VKI international two-year budget ($784K). Awarded five USAF VKI fellowships ($50K).
- (U)- AGARD - Funded US technical expert participation in NATO AGARD-sponsored biannual sessions of 9 technical panels, 21 working groups, 4 study groups, and 1 study committee. Supported over 50 conferences and courses and 60 working/study group meetings. Activities produced 80 technical publications ($411K).
- (U)- Air Force International Programs Support Activity (AFIPSA) - Partially staffed this new named activity as the USAF center of expertise for ICRD&A activities. Negotiated and concluded new agreements to assure USAF access to overseas technology and to leverage USAF R&D investments via cooperative programs. ($200K).
- (U)- ICRD&A - Funded Air Force ICRD&A activities: Managed 164 international Data Exchange Agreements (DEAs) and 80 Memorandums of Understanding (MOUs). Developed or amended 30 MOUs, 26 DEAs, 6 Long Term Technology Projects (LTTPs), and 7 loan agreements to leverage allied resources in direct support of USAF science and technology thrusts. Completed a congressionally mandated study of cooperation with Israel. Pursued allied participation in military satellite communications as a potential Nunn program. Supported management of USAF Foreign Comparative Test (FCT) and Nunn programs. Continued support of DOD-led Systems and Technology Forum with Japan. Initiated collaborative projects under the Four-Power ASNR Council and Israeli Reciprocal Defense Procurement Agreement. Initiated technology acquisition projects with the FSU and supported ESEP with 14 countries. Supported the NAFAG along with its associated Air Groups to promote NATO standardization and development of ICRD&A programs. Supported four USAF overseas R&D liaison offices ($1,877K).

(U) FY 1994 Plans:

- (U) FY94 plans reflect a 50% Congressional reduction in international cooperative efforts adversely impacting USAF's ability to comply with US and DOD international commitments.
- (U)- STC - Support reduced staff in the US R&D Coordination Office and seven US scientists/engineers at the STC. ($100K).
- (U)- VKI - Fund US share of residual VKI international budget ($50K).

Date: February 1994

Program Element: #[illegible]04F
PE Title: International Activities
Budget Activity: #7 - Operational System Development
Old Budget Activity: #6 - Defense Wide Mission Support

(U)- AGARD - Fund US technical expert partial participation in NATO AGARD-sponsored biannual sessions of 7 technical panels, 21 working groups, 4 study groups, and 1 study committee ($234K).

(U)- AFIPSA Fully staff this new organization as the USAF center of expertise for ICRD&A activities to develop, process and manage MOUs, DEAs, LTTPs, loans and other international agreements. Negotiate and conclude new agreements to assure USAF access to overseas technology and to leverage USAF R&D investments via cooperative programs. ($483K).

(U)- ICRD&A - Fund Air Force ICRD&A activities: Support cooperative efforts focusing on foreign strengths in Defense Critical Technologies. Support the Four-Power ASNR Council, NAFAG and its Subgroups to promote NATO standardization and development of ICRD&A programs. Support ESEP with 14 countries. Support four USAF overseas R&D liaison offices. Support technology acquisition activities from the FSU countries ($1,042K).

(U)FY 1995 Plans:

(U)- STC - Fulfill US commitments with a fully staffed US R&D Coordination Office, support seven US scientists and engineers assigned to the STC, and provide liaison services between US government agencies and the STC ($150K).

(U)- VKI - Fund US national share (12.8%) of the VKI budget ($430K). Award two USAF VKI fellowships ($20K).

(U)- AGARD - Fund US technical representation at AGARD-sponsored biannual sessions of 7 technical panels, 21 working groups, 4 study groups, 1 study committee and publish associated technical reports. Based on AGARD National Delegates and HQ NATO approval, activities will focus on aerospace research, evolving technologies, dual-use applications, and other NATO/national needs. Special study areas of military significance include non-lethal means for diverting or forcing non-cooperative aircraft to land and enhancing the survivability of military transport aircraft in a multi-threat environment. Expand Partnership for Peace initiative through AGARD OUTREACH program incorporating FSU scientific and technical groups. Sponsor the AGARD National Delegates Board Meeting in the US ($500K).

(U)- AFIPSA Fund AFIPSA as the USAF center of expertise for ICRD&A activities to develop, process and manage MOUs, DEAs, LTTPs, loans and other international agreements. Negotiate and conclude new agreements to assure USAF access to overseas technology and to leverage USAF R&D investments via cooperative programs. AFIPSA will focus on establishment of "umbrella" agreements with our key international partners to simplify the ICRD&A process ($450K).

Date: February 1994

Program Element: #1001004F
PE Title: International Activities
Budget Activity: #7 - Operational System Development
Old Budget Activity: #6 - Defense Wide Mission Support

(U)- ICRD&A - Fund Air Force ICRD&A activities: Support DOD-led Systems and Technology Forum with Japan. Provide for management and support of USAF Nunn and FCT Programs. Pursue numerous collaborative projects including space, command and control, and munitions programs under the Four-Power ASNR Council. Continue cooperative efforts to access foreign strengths in Defense Critical Technologies. Increase East European cooperation and technology acquisition from FSU countries. Improve technology assimilation into USAF labs through new initiatives under USAF engineer and scientist exchanges. Support NAFAG and its associated Air Groups to promote NATO standardization, harmonization of requirements, ICRD&A programs, and US exports. The NAFAG will address NATO's requirement for an airborne ground surveillance program and provide a forum for promoting the US Joint Surveillance Target Attack Radar System. Support ESEP with 14 countries. Support cooperative ventures through four USAF overseas R&D liaison offices. Many of these activities continue commitments in support of congressional and DOD guidance ($1,886K).

(U) Work Performed By: Senior USAF civil servant, military, and contractor scientists, engineers and administrators. The Chief of the International Programs Division in the Office of the Assistant Secretary of the Air Force (Acquisition) administers the program with support from Air Force International Support Programs Activity. Limited technical support is provided by Techplan Corporation in Arlington, Virginia and Dayton, Ohio.

(U) Related Activities: This program provides for USAF management of DOD funded Nunn (PE0605130D) and FCT (PE0603790D) programs. There is no unnecessary duplication of effort within the Air Force or the Department of Defense.

(U) Other Appropriation Funds ($ in Thousands): Not Applicable.

(U) International Cooperative Agreements: This program deals entirely with International Cooperative Research, Development, Test and Acquisition. It implements USAF obligations to our allies, alliances, treaty commitments and cooperative agreements aimed at securing shared systems benefits and savings as directed by US Title 10 and DODD 5000.1 & 5000.2. STC support is based on STC Charter signed in 1963 by all NATO countries. VKI support is based on NATO funding agreements signed in 1959 which commit the US to share funding with other NATO countries. AGARD support is based on AGARD Charter signed

Date: February 1994

Program Element: #1001004F
PE Title: International Activities
Budget Activity: #7 - Operational System Development
Old Budget Activity: #6 - Defense Wide Mission Support

in 1971 by all NATO countries. ICRD&A support is based on US Title 10, Section 2350a, pending 2350j, and numerous international agreements and programs signed at the Secretary or Deputy Secretary of Defense level.

1. COMPONENT	FY 1993 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
AF (AFMC)		1 OCT 93

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
AIR FORCE MATERIEL COMMAND	UNSPECIFIED MINOR CONSTRUCTION

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
65876F			EEIC 529 2,899.0

9. COST ESTIMATES

ITEM	UNIT	QUANTITY	UNIT COST	COST ($000)
UNSPECIFIED MINOR CONSTRUCTION (Multiple projects, each less than $300,000)	LS			2,899.0

10. DESCRIPTION OF PROPOSED CONSTRUCTION

REQUIREMENT: Modify or reconfigure existing facilities to support expanding or changing research experiments.

CURRENT SITUATION: Research on advance aircraft and weapons system requires e tensive testing and experimentation. While that Air Force is on an overall downsizing mode, our research requirement has not decreased. Aircraft and weapons systems have not been canceled and development will continue. In order to maximize utilization of our existing facilities it is necessary to modify or reconfigure these facilities to accomodate the new experiments or test activities. This work can include but is not limited to constructing target bunkers, modifying a laborarory to accept high power lasers or increasing the power supplied to a facility for a high temperature furnace to permit development of new metal alloys.

IMPACT IF NOT PROVIDED: If the unspecified minor construction funding is not supported at the budgeted amount many research projects, critical to the national defense cannot be completed. Systems such as the YF-22, C-17 and various other programs may be unacceptably delayed for production.

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1 COMPONENT	FY 1994 MILITARY CONSTRUCTION PROJECT DATA	2 DATE
AF (AFMC)		1 FEB 94

3 INSTALLATION AND LOCATION	4. PROJECT TITLE
AIR FORCE MATERIEL COMMAND	UNSPECIFIED MINOR CONSTRUCTION

5 PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
65876F			EEIC 529 7,467.0

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
UNSPECIFIED MINOR CONSTRUCTION (Multiple projects, each less than $300,000)	LS			7,467.0

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1007

1 COMPONENT	FY 1995 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
AF (AFMC)		1 FEB 94

3 INSTALLATION AND LOCATION	4. PROJECT TITLE
AIR FORCE MATERIEL COMMAND	UNSPECIFIED MINOR CONSTRUCTION

5 PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
65876F			EEIC 529 3,281.0

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
UNSPECIFIED MINOR CONSTRUCTION (Multiple projects, each less than $300,000)	LS			3,281.0

10. DESCRIPTION OF PROPOSED CONSTRUCTION

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1008

1. COMPONENT	FY 1995 RDT&E FACILITY PROJECT DATA (computer generated)	22 JUL 1993
AIR FORCE		

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
VANDENBERG	ALTER SPACE LAUNCH COMPLEX 4E, TITAN IV PROGRAM

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST($000)
3.41.11 F	312-477	XUMU921122	1,600.0

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
ALTER SPACE LAUNCH COMPLEX 4E, TITAN IV PROGRAM	LS			1,372.2
INSTALL BREATHING AIR SYSTEM	LS			(807.4)
MODIFY CAMERA POWER SYSTEM	LS			(161.0)
INSTALL SPRINKLER SYSTEM	LS			(403.8)
SUBTOTAL				1,372.2
CONTINGENCY (10%)				137.2
TOTAL CONTRACT COST				1,509.4
SUPERVISION, INSPECTION AND OVERHEAD (6%)				90.6
TOTAL FUNDED COST				1,600.0

10. Description of Proposed Construction: Install breathing air system, camera power modifications, install sprinkler system, and all necessary support.

11. REQUIREMENT: As required.

PROJECT: Alter Space Launch Complex 4E to support the Titan IV Program.

REQUIREMENT: National Security requirements dictate a continuing, highly reliable means of placing critical classified R&D payloads into required orbits. The Titan IV program provides the capability to launch the largest of these satellites into near-earth or geosynchronous orbits. Modifications to Space Launch Complex 4E are necessary to continue providing this capability. A breathing air system with a quick disconnect system is required to provide workers with air during fuel and oxidizer operations. Adequate power to photo motion picture cameras is required to provide technical data during ignition and lift-off of vehicles. A fire sprinkler system is needed in the SRM Transporter Facility to protect these one-of-a-kind assets from possible fire loss

CURRENT SITUATION: Personnel operating in the Mobile Service Tower during fueling and oxidizing operations must carry portable air bottles. These units are bulky and cumbersome to work with. Access to certain areas is restricted by the size of the units. The existing power supply to the cameras is outdated and unreliable. The SRM Transporter Facility does not have a sprinkler system.

IMPACT IF NOT PROVIDED: Personnel will continue to use air bottles, which restricts their ability to perform work during refueling operations. Critical film coverage of umbilical tower seperations, layered disconnects, and flying objects/debris during launch operations will not be possible. Loss of valuable SRM transporter assets would delay Titan IV

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1. COMPONENT	FY 1995 RDT&E FACILITY PROJECT DATA (computer generated)	2. DATE
AIR FORCE		22 JUL 1994
3. INSTALLATION AND LOCATION		
VANDENBERG		
4. PROJECT TITLE		5. PROJECT NUMBER
ALTER SPACE LAUNCH COMPLEX 4E, TITAN IV PROGRAM		XUMU921122

launches until a replacement is obtained.
ADDITIONAL: This facility is contractor operated and the contractor is solely responsible for the complete and total operation and maintenance of the complex. DOD 7110-1-M and 10 USC 2353 authorize the use of RDT&E funds to construct facilities necessary for the performance of a contract. This complex supports contracts associated with classified RDT&E payloads. There is no criteria/scope for this project in Part II of Military Handbook 1190, "Facility Planning and Design Guide".

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1. COMPONENT	FY 1995 RDT&E FACILITY PROJECT DATA (computer generated)	22 JUL 1993
AIR FORCE		

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
VANDENBERG AIR FORCE BASE, CALIFORNIA	DIRECT CURRENT ELECTRICAL POWER UPGRADE

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST($000)
3.41.11 F	813-231	XUMU921124	2,500.0

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
DIRECT CURRENT ELECTRICAL POWER UPGRADE	LS			2,144.1
SUBTOTAL				2,144.1
CONTINGENCY (10%)				214.4
TOTAL CONTRACT COST				2,358.5
SUPERVISION, INSPECTION AND OVERHEAD (6%)				141.5
TOTAL FUNDED COST				2,500.0
RDT&E EQUIPMENT				2,500.0
TOTAL COST				5,000.0

10. Description of Proposed Construction: Install/replace electrical wiring, transformers, grounding systems, switching equipment, and circuit breakers. Structural penetrations to existing facilities and pavements as necessary to support electrical work.

11. REQUIREMENT: As required.

PROJECT: Install direct current (DC) electrical power at Space Launch Complex (SLC) 4.

REQUIREMENT: National Security requirements dictate a continuing, highly reliable means of placing critical classified R&D payloads into required orbits. Reliable DC electrical power is required to support Titan IV and II launches at SLC-4 in support of DoD research and development payloads. Electrical power must include primary, redundant, back-up, uninterruptible and essential systems. DC grounding must include facility and flight vehicle single point ground, static ground, and technical black/red grounding systems. All work must meet current National and Air Force Life Safety Codes.

CURRENT SITUATION: The existing alternating current (AC) electrical power system at SLC-4 is over 20 years old. It was originally designed to provide power for earlier launch vehicles which required AC power. The Titan II and IV systems require DC. Since it is not available on the complex's secondary electrical distribution system, the contractor has been forced to use portable DC units. This method is inefficient and raises the potential for a catastrophic accident. Also, over the years many different types of aerospace ground and test support equipment have been added on, each requiring its own power supply. These systems have not been satisfactorily integrated or isolated, creating an ever increasing potential for life safety hazards, and delays to the launch of

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1. COMPONENT	FY 1995 RDT&E FACILITY PROJECT DATA (computer generated)	2. DATE
AIR FORCE		22 JUL 1993
3. INSTALLATION AND LOCATION		
VANDENBERG AIR FORCE BASE, CALIFORNIA		
4. PROJECT TITLE		5. PROJECT NUMBER
DIRECT CURRENT ELECTRICAL POWER UPGRADE		XUMU921124

research and development payloads.
IMPACT IF NOT PROVIDED: Power systems failures could cause contractor work stoppages and delays to the launch of a critical DoD payload. Aging and outdated electrical power systems may expose contractor and government personnel at the site to injuries.
ADDITIONAL: This facility is contractor operated and the contractor is solely responsible for the complete and total operation and maintenance of the complex. DOD 7110-1-M and 10 USC 2353 authorizes the use of RDT&E funds to construct facilities necessary for the performance of a contract. This complex supports contracts associated with classified RDT&E payloads. There is no criteria/scope for this project in Part II of Military Handbook 1190, "Facility Planning and Design Guide".

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