

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)								DATE February 1999		
BUDGET ACTIVITY 6 - Management and Support				PE NUMBER AND TITLE 0604759F Major Test And Evaluation Investment				PROJECT 4597		
COST (\$ In Thousands)	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
4597 (U) Air Force Test Investments	53,000	40,416	47,334	56,238	51,568	51,798	65,089	77,396	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0	0

(U) A. Mission Description

This program element provides planning, improvements, and modernization for test capabilities at three Air Force Test Centers: Air Armament Center (AAC), Arnold Engineering Development Center (AEDC), and Air Force Flight Test Center (AFFTC). The purpose is to help test centers keep pace with emerging weapon system technologies. For example, advances in missile seeker technology and capabilities drive the requirement for improvement in missile seeker test capabilities such as the Guided Weapon Evaluation Facility (GWEF) and the Seeker T&E projects; advances in the Global Positioning System (GPS), providing greater time-space-position accuracy, will be integrated into the ranges at Eglin and Edwards Air Force Bases; and advances in computer capabilities, which will enhance efficiencies in data collection, analysis, and distribution, will be exploited in the Data Acquisition and Processing System (DAPS) and Computer Aided Modernization Project (CMP) projects. Test investment activities are also funded at the Space and Missile Systems Center Test Directorate (SMC/TE) and the Joint Program Office (JPO) for Test and Evaluation (T&E). The fluctuations in the funding at these locations are due to changing priorities in the improvement and modernization requirements as defined through the AF Test Investment Planning & Programming Process. Also, all projects have been reviewed through the tri-Service Reliance effort (to communicate AF efforts to the other Services and avoid unwarranted duplication of effort) and are documented in the Test Capability Master Plans. Further, each 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 \$10 billion 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.

AAC, located at Eglin AFB, FL, conducts and supports developmental test and evaluation and operational test and evaluation of non-nuclear air armaments, C⁴I systems, and target acquisition and weapon delivery systems; provides a climatic simulation capability; and determines target/test item spectral signatures. The Guided Weapon Evaluation Facility (GWEF) provides a full spectrum, multifunctional seeker/sensor laboratory test capability for all guided weapons. Common Airborne Instrumentation System (CAIS) Integration provides standardized airborne test instrumentation to enhance interoperability and commonality. Global Positioning System (GPS) Range Systems will provide a major improvement for Time-Space-Position-Information (TSPI) at all Major Range and Test Facility Bases (MRTFB) and specifically at the Eglin Ranges for munitions testing. Command, Control, Communications, Computers and Intelligence (C⁴I) Test Capabilities Upgrade will provide connectivity to existing capabilities and add needed networks and hardware to develop a C⁴I test bed. The Preflight Integration of Munitions and Electronic Systems (PRIMES) facility conducts preflight test and evaluation of total integrated weapon systems in a secure anechoic chamber. The Armament Systems Test Environment (ASTE) Range Systems effort upgrades instrumentation of the major data collection systems supporting open air testing. Mission Control/Data Analysis provides for real-

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time central mission control and analysis. Multispectral Missile Engagement Hardware-in-the-Loop (HITL) Test provides a capability to support multiple and wide field-of-view missile engagements incorporating multispectral stimulators. The Santa Rosa Island Reconstitution effort will provide hardware-in-the-loop equipment for three focus sites to support armament/munitions and C⁴I testing. Seeker T&E will upgrade unique Electro-Optics/Infrared/Milimeter Wave (EO/IR/MMW) field measurement capabilities to support tri-Service smart weapons development. These projects ensure test center technology is compatible with weapon systems to be tested such as AMRAAM, JDAM, ASRAAM, AGM-130, JTIDS, JSTARS, Combat Talon, etc.

AEDC, located at 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 AEDC Data Acquisition and Processing System (DAPS) 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 Computer Aided Modernization Project (CMP) will provide increased capability for data processing and storage and provide wider availability of workstations. The Propulsion Wind Tunnel (PWT) Upgrades project sustains long-term operation of tunnels 16T and 16S to meet transonic/supersonic test needs. The Improve Turbine Engine Structural Integrity project will provide new state-of-the-art structural test monitoring and data analysis systems to support turbine engine structural tests to detect and analyze high cycle fatigue. The Hypersonic Capability Development project provides for the studies and analysis of the hypersonic wind tunnel requirements definition and program planning.

AFFTC, located at Edwards AFB, CA conducts and supports developmental test and evaluation and operational test and evaluation of aircraft and aircraft systems, aerospace research vehicles, uninhabited aerial vehicles, cruise missiles, parachutes delivery/recovery systems, and cargo handling systems. The AF Common Airborne Instrumentation System (CAIS) Integration & Support (I&S) supports DoD objectives for interoperability/commonality. The goal of CAIS I&S is to integrate CAIS equipment and supporting instrumentation equipment and systems to provide a full airborne instrumentation operational capability. 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 of the next decade. The developmental approach is directed towards providing a high degree of interoperability between systems and components 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 Space Based Data Relay (SBDR) project provides the capability for Advanced Range Instrumentation Aircraft (ARIA) to fulfill customer needs for real time, high-speed data, and greatly improve the range data relay capability. The Flight Simulation Modernization project will upgrade the Test and Evaluation Modeling and Simulation (TEMS) facility to meet future man-in-the loop simulator requirements. The Modeling and Simulation T&E Resources (MASTER) project will provide the Test and Evaluation Modeling and Simulation (TEMS) facility with subsystem models to build future simulations and the tools to validate real-time modeling with ground tests and open-air range flight test. The Linked Interactive T&E Networking (LITENING) project will provide the network infrastructure to support inter-range simulations and support the efficient transmission of flight test data to various facilities for processing and analysis. The Advanced Range Telemetry (ARTM) Integration project will procure and integrate improved range telemetry systems to provide greater efficiencies in telemetry frequency utilization.

SMC/TE located at Kirtland AFB, NM is responsible for test planning and implementation for all space and ballistic missile systems. The Combined Space Test Task Force project will provide the capability to develop and test new satellites and ground control systems.

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(U) <u>FY 1998 (\$ in Thousands):</u>		
Air Armament Center		
– (U) \$4,881	CAIS Integration. Continued integration, procured production units, and continue procurement of support equipment.	
– (U) \$1,838	C ⁴ I Test Capabilities Upgrade. Continued the acquisition of workstations, network connections, and processing hardware/software. Began secure facility upgrades.	
– (U) \$3,453	GWEF. Continued development of the expanded radar simulator and the midwave infrared simulator. Began aircraft/munitions modeling and simulation.	
– (U) \$1,113	GPS Range Integration. Continued GPS integration on the range and Central Control Facility. Began acquisition of a translator/processor system.	
– (U) \$1,632	PRIMES. Acquired a Communication-Navigation-Identification(CNI) simulator, upgraded the GPS simulator and began the munitions interface simulations.	
– (U) \$1,359	ASTE Range Systems. Began upgrades to TSPI systems, timing, telemetry, microwave, communications, arenas, gun test, photo-optics, and fiber optics.	
– (U) \$9,300	Santa Rosa Island Reconstitution. Began development of three focus sites to provide open air Hardware-in-the-Loop (HITL) capability.	
Arnold Engineering Development Center		
– (U) \$2,231	AEDC DAPS. Continued acquisition and installation of additional workstations/processors in engine test cells. IOC of C1/C2 test cells.	
– (U) \$1,294	CMP. Continued purchase of CMP workstations (design fourth increment). Continued to implement the AEDC Reengineering Computer Base.	
– (U) \$8,270	PWT Upgrades. Began design and procurement of PWT data acquisition and processing systems. Started requirements planning for flow quality and electric motor repower improvements.	
– (U) \$1,890	Hypersonic Capability Development. Issued study contracts for requirements definition and program planning.	
Air Force Flight Test Center		
– (U) \$6,037	CAIS I&S development. Purchased CAIS components for AFFTC use. Continued Test Instrumentation Management System (TIMS) development with automated setup of systems, automated diagnostics, and simulation capability. Began development of an on-board processing capability.	
– (U) \$3,346	ARIA SBDR. Completed the communications portion of the SBDR program for three aircraft. Continued hardware/software integration of the SBDR subsystems upgrades for a three-aircraft fleet.	
– (U) \$6,034	ADAPS. Continued integration of ADAPS with ground test simulation capabilities. Began marketing capabilities to support multiple flight test missions including tri-Service Operational flight tests. Developed capability to increase test data flow throughput and decreased flight test mission turnaround time. IOC of AFFTC Post Test Analysis System and Auxiliary Processing and Analysis System.	
Other Projects		
– (U) \$ 322	Joint Program Office for T&E support.	
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<ul style="list-style-type: none"> - (U) \$53,000 Total (U) <u>FY 1999 (\$ in Thousands):</u> Air Armament Center - (U) \$2,050 CAIS Integration. Continue integration, procure production units, and continue procurement of support equipment. - (U) \$ 666 C⁴I Test Capabilities Upgrade. Continue the acquisition of workstations, network connections, and processing hardware/software. Complete secure facility upgrades. - (U) \$2,349 GWEF. Complete the expanded radar simulator and midwave IR simulator. Begin development of the multispectral man-in-the-loop and the active laser simulator. Continue aircraft/munitions modeling and simulation. - (U) \$3,011 GPS Range Integration. Continue integration and complete the acquisition of translator/processor system. - (U) \$1,524 PRIMES. Begin the aircraft/munitions interface simulations. Complete the CNI simulator data link and acquire an F-15/APG 63-V1 radar interface. - (U) \$1,646 ASTE Range Systems. Continue upgrades to TSPI systems, telemetry, microwave, communications, arenas, gun test, and photo-optics. - (U) \$ 969 Mission Control/Data Analysis. Begin procurement of data acquisition equipment and real-time TM equipment, and a 3-D terrain generation/visualization capability. - (U) \$1,862 Multispectral Missile Warning System Test Capability. Begin acquisition of a high off boresight angle flight motion simulator, a target generator and development of target and clutter models. - (U) \$2,500 Santa Rosa Island Reconstitution. Continue development of three focus sites to provide open air Hardware-in-the-Loop (HITL) capability. - (U) \$1,250 EC Operational Test and Training. Provide for the operations and maintenance of range assets required by AFSOC to test and train aircrews at the Eglin location. Arnold Engineering Development Center - (U) \$ 997 AEDC DAPS. Complete installation of the J4 rocket test cell DAPS. IOC of J1/J2 test cell portion of DAPS. - (U) \$ 992 CMP. Continue purchase of CMP workstations. Continue to implement the AEDC Reengineering Computer Base. - (U) \$4,560 PWT Upgrades. Continue installation of data acquisition and processing system in 16T and 16S tunnels. Complete installation of the on-cart data acquisition and processing system in the 16T wind tunnel and the pre-test check out system in the 16T/16S wind tunnels. Begin design of plant control systems. - (U) \$ 801 Improve Turbine Engine Structural Integrity. Begin design and procurement of Non-Intrusive Stress Monitoring System (NSMS) hardware. Install dynamic data acquisition and processing system. - (U) \$2,800 Hypersonic Capability Development. Continue study contracts for requirements definition and program planning. Air Force Flight Test Center 		
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<ul style="list-style-type: none"> - (U) \$3,514 CAIS I&S development. Finish rehost of TIMS to Windows NT platform and improve TIMS with automated setup of systems, automated diagnostics, and simulation capability. Continue development of an on-board processing capability. Begin development of an advanced solid state recorder. - (U) \$5,126 ADAPS. Continue to integrate simulation system with real-time data analysis capability. Begin development of desktop simulation capability. Continue to provide the traditional structures & flutter post-test analysis capability in near real-time in the Ridley Mission Control Rooms. Begin installation of post test analysis capabilities for flight testing. Provide avionics data processing in near real-time in the Ridley Mission Control Rooms. Ensure Y2K compliance of all systems under development. - (U) \$1,127 Flight Simulation Modernization. Upgrade of the TEMS facility with hardware and software interfaces for the first two of four reconfigurable man-in-the-loop Air Warfare Mission Simulator (AWMS) cockpits. - (U) \$ 718 LITENING. Begin development of AFFTC high-speed network to link test capabilities such as Electronic Combat Integrated Test (ECIT) Facility and the Ridley Mission Control Center. Develop connectivity to the Defense Research Engineering Network (DREN) which will link Edwards AFB with other T&E facilities. Other Projects - (U) \$ 247 Joint Project Office for T&E support. - (U) \$ 902 Combined Space Test Task Force. Begin procurement of hardware and software to complete evaluations of on-orbit R&D satellites and technologies. Begin development of a satellite command and control database and models. - (U) \$ 805 Identified as a source for SBIR. - (U) \$40,416 Total 		
(U) <u>FY 2000 (\$ in Thousands):</u>		
	Air Armament Center	
- (U) \$2,927	CAIS Integration. Continue integration, procure mini-CAIS hardware, and continue procurement of support equipment for CAD/CAM and preflight quick-look capability.	
- (U) \$1,792	C ⁴ I Test Capabilities Upgrade. Continue acquisition of workstations, network connections, and processing hardware/software. Begin upgrades to the JTIDS OPFAC.	
- (U) \$1,744	GPS Range Integration. Continue acquisition of Advanced Range Data System (ARDS) pods, S/W improvements, and ground vehicle instrumentation.	
- (U) \$1,902	PRIMES. Continue development of aircraft/munitions interface simulations for AIM 9-X, JDAM, and F-15. Continue advanced signature generator upgrades.	
- (U) \$2,719	ASTE Range Systems. Continue upgrades to telemetry, TSPI systems, communications and arenas. Begin upgrades to gun ranges, microwave, fuze test, and range instrumentation systems. Acquire a Forward Looking Infrared (FLIR) system, video phototheodolites, and coherent tracking capability.	
- (U) \$1,259	Mission Control/Data Analysis. Continue procurement of data acquisition equipment and 3-D terrain generation/visualization capability. Begin acquisition of H/W and S/W for "near" real-time data processing.	
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<ul style="list-style-type: none"> - (U) \$1,660 Multispectral Missile Warning System Test Capability. Complete the high off boresight angle flight motion simulator (FMS) and target generation simulator acquisition. Continue development of target/clutter models. - (U) \$3,747 GWEF. Continue acquisition of the multispectral man-in-the-loop and active laser simulator capabilities. Continue development of aircraft/munitions modeling and simulation. -- (U) \$1,369 Seeker T&E. Begin upgrades to the MMW measurement systems. Acquire a shortwave and a midwave focal plane array (FPA) imaging radiometers. <p>Arnold Engineering Development Center</p> <ul style="list-style-type: none"> - (U) \$2,361 CMP. Add increment five worksystems. Complete the Aircraft Systems Test Operations Pilot (Design-Build-Install). Integrate the Product Data Manager application software packages. Complete the migration of real-property drawings and designs to a raster format. - (U) \$9,761 PWT Upgrades. Complete installation of data acquisition and processing system in the 16T wind tunnel. Design the 16S wind tunnel data acquisition and processing system. Begin installation of 16S wind tunnel data acquisition and processing system. Begin installation of 16T/16S wind tunnel plant control systems. Begin planning/design for electric motor repower upgrades. Begin planning for flow quality improvements. - (U) \$1,047 Improve Turbine Engine Structural Integrity. Procure/install Non-Intrusive Stress Monitoring System (NSMS). Install additional channels for the dynamic data acquisition and processing system. <p>Air Force Flight Test Center</p> <ul style="list-style-type: none"> - (U) \$3,680 CAIS I&S. Complete development and implementation of an internet-based instrumentation management information system. Procure additional airborne Solid State Recorder. Procure bandwidth efficient telemetry transmitters and demodulators. Begin the development of a virtual test bench to support end-to-end data checkout of airborne instrumentation systems. Provide the capability to support new airborne instrumentation capabilities including: on-board processing innovations, optical bus monitoring units, and high data rate decommutation and recording. - (U) \$2,829 ADAPS. Integrate real-time systems across the flight test center to replace older systems. Begin distribution of full capability for post test analysis system. Evaluate and activate first prototypes of modeling and simulation integration of real-time operations. Complete final Y2K readiness testing on all systems. - (U) \$3,393 Flight Simulation Modernization. Upgrade TEMS facility with the hardware and software interfaces for the third and fourth configurable man-in-the-loop AWMS cockpits, one helmet mounted display with a controller, and one 360 degree out-the-window projection system. Start development of real-time threat environment, radar, and FLIR models. - (U) \$2,169 LITENING. Expand the Asynchronous Transfer Mode (ATM) Network to the Combined Test Forces and critical Range Support buildings. Begin development on the ATM Network Operations Center and base-wide network services. - (U) \$1,679 MASTER. Develop the repository for models and data using established procedures to validate them with data collected during ground and flight test. The models and the data will be used to support man-in-the-loop simulator testing and training, which will support configurable simulations for the AWMS cockpits. Existing models will be converted to Joint Modeling & Simulation System (J-MASS) real-time compatible models. <p>Other Projects</p>		
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– (U) \$ 337	Joint Project Office for T&E support.	
– (U) \$ 959	Combined Space Test Task Force. Begin development and acquisition of expert systems to support operations and testing of future technology for R&D satellites. Evaluate effectiveness of these systems and their value to support warfighter needs.	
– (U) \$47,334	Total	
(U) <u>FY 2001 (\$ in Thousands):</u>		
	Air Armament Center	
– (U) \$3,052	CAIS Integration. Complete integration and required support equipment acquisition.	
– (U) \$1,785	C4I Upgrade. Complete the acquisition of workstations, connectivity, HW/SW upgrades, and JTIDS OPFAC upgrades. Acquire test analysis equipment and M&S tools.	
– (U) \$3,073	GWEF. Complete the multispectral man-in-the-loop and the active laser simulator developments. Continue aircraft/munition M&S efforts. Acquire an environmental generator.	
– (U) \$1,740	GPS Range Integration. Complete acquisition of ARDS pods, S/W improvements, and ground vehicle instrumentation.	
– (U) \$1,704	PRIMES. Complete the aircraft/munitions interface simulations and acquire a synthetic aperture radar target simulator.	
– (U) \$1,934	ASTE Range Systems. Complete acquisition of instrumentation/equipment for infrastructure upgrades in such areas as TSPI, microwave, TM, fiber optics/communications, arena test, gun ranges, high speed video, and fuze test.	
– (U) \$1,429	Mission Control/Data Analysis. Complete procurement of data acquisition equipment, near real-time data processing equipment, and a 3-D terrain generation/visualization capability.	
– (U) \$ 850	Seeker T&E. Complete upgrades to the MMW measurement system and acquire a high speed digital data recorder, a longwave length FPA imaging radiometer, and a midwave length FPA FLIR system. Upgrade the Airborne Seeker Evaluation Test System (ASETS) instrumentation.	
	Arnold Engineering Development Center	
– (U) \$ 3,812	CMP. Procure/Install increment six worksystems. Complete Product Data Manager integration with application software packages. Upgrade older worksystems to the state-of-the-art PC hardware configuration. FOC of CMP systems.	
– (U) \$20,319	PWT Upgrades. Complete installation of 16S wind tunnel data acquisition and processing system. Complete installation of plant control systems in 16T/16S wind tunnels. Initiate procurements for electric motor upgrades. Begin design of flow quality improvements.	
– (U) \$ 894	Improve Turbine Engine Structural Integrity. Complete installation of the dynamic data acquisition and processing system and the NSMS. Begin planning/design of the Structural Dynamic Response Analysis Capability.	
	Air Force Flight Test Center	
– (U) \$2,687	CAIS I&S. Complete the development of the virtual test bench for hardware-in-the-loop simulation for instrumentation unit troubleshooting. Provide interactive data acquisition command and control, including control link setup and checkout from the ground to test vehicle. Provide data compression and on-board processing operational capability developed under the ARTM program.	
– (U) \$2,625	ADAPS. Complete integration of the post test analysis capability at the Combined Test Force level. Complete post test analysis development. Complete the installation of common data systems throughout the Flight Test Center. Complete development of the real-time/postflight capability. Complete integration of modeling and simulation with real-time operations.	
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<ul style="list-style-type: none"> - (U) \$3,923 Flight Simulation Modernization. Procure computers for the second and third man in the loop stations. Provide display capability for the third man in the loop station. Purchase cockpit displays for second and third man in the loop station. - (U) \$2,343 LITENING. Improve the reliability and transmission capability of range support facilities. Develop the Network Operations Center to monitor and manage network traffic loads. Expand secure network links to allow classified test data to be transferred between integrated secret, compartmentalized facilities. - (U) \$2,021 MASTER. Convert and validate flying qualities and avionics models acquired from System Program Offices into J-MASS compatible models. Arnold AFB will begin to convert propulsion, weapons, and airframe interaction models. - (U) \$ 775 Advanced Range Telemetry (ARTM) Integration. Initiate procurement of airborne and ground telemetry equipment developed through OSD funded ARTM. New equipment will provide capability to increase test data throughput, resulting in more efficient open air testing. Other Projects - (U) \$ 321 Joint Project Office for T&E support. - (U) \$ 951 Combined Space Test Task Force. Continue development and evaluation of expert systems to support operations and testing of future technology R&D satellites. Implement lessons learned and transition technical advancements to operational users. - (U) \$56,238 Total 		
<p>(U) B. Budget Activity Justification: This Program Element is in Budget Activity 6, Management and Support, because it is a Research and Development (R&D) effort for Improvement and Modernization of T&E capabilities at Air Force Test Centers.</p>		
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<p>(U) D. <u>Other Program Funding Summary (\$ in Thousands):</u> None</p> <p>Related RDT&E: (U) PE 0604256F, Threat Simulator Development (U) PE 0604940D, Central Test and Evaluation Investment Program</p> <p>(U) E. <u>Acquisition Strategy:</u> This program element uses several different contracting strategies to provide the most cost effective T&E investment solutions. The main acquisition strategy is to use full and open competition wherever possible to improve and modernize existing test capabilities.</p> <p>(U) F. <u>Schedule Profile:</u> This PE contains multiple schedule profiles which are available upon request.</p>		
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