Exhibit R-2, RDT&E Budget Item Justification

DATE **February 2008**

BUDGET ACTIVITY
06 RDT&E Management Support

PE NUMBER AND TITLE
0604759F Major T&E Investment

Cost ($ in Millions)	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	63.417	63.855	61.818	63.232	66.688	67.934	68.770	Continuing	TBD
4597 Air Force Test Investments	63.417	63.855	61.818	63.232	66.688	67.934	68.770	Continuing	TBD

In FY 2008, Project 4597, Air Force Test Investments, includes new start efforts

(U) A. Mission Description and Budget Item Justification

This PE provides planning, improvements, and modernization for test capabilities at four Air Force test organizations: 46 Test Wing of the Air Armament Center (AAC) (to include 46 Test Group at Holloman), Arnold Engineering Development Center (AEDC), Detachment 12 of the Space & Missile Center (Det 12, SMC), and Air Force Flight Test Center (AFFTC). The purpose is to help test organizations keep pace with emerging weapon system technologies. For example, advances in missile seeker technology and capabilities drive the requirements for improvement in missile seeker test capabilities such as the Scene Characterization and Reconstruction for Advanced Munitions (SCRAM) project; 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 Processing Multi-Stage Improvement Program (DPMSIP). Test investment activities are also funded for activities supporting the Test and Evaluation (T&E) Board of Directors and for the Technology Insertion & Risk Reduction (TIRR) program, formerly the Test Technology Development (TTD) program. The TIRR program provides funds to initiate studies of new technologies and test methodologies to determine their feasibility for future T&E investment within the scope of this program element. The intent is to reduce the cost and risk associated with new technologies and methodologies using short-term (1-3 years) limited-funding projects prior to investing in larger programs.

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 (TIPP). Also, all projects have been reviewed through the Tri-Service Reliance process (to communicate AF efforts to the other Services and avoid unwarranted duplication of effort) and are documented in Reliance Area Capability Summaries (RACS). 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 locations 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 test organizations 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.

The 46TW, located at Eglin AFB, FL, conducts and supports developmental test and evaluation (DT&E) of non-nuclear air armaments, Command, Control, Communications, Computers and Intelligence (C4I) systems, and target acquisition and weapon delivery systems; navigation systems; provides a climatic simulation capability; and determines target/test item spectral signatures. Advanced Airborne Instrumentation Integration (AAII) provides standardized airborne test instrumentation to enhance interoperability and commonality. C4I Advanced Simulation and Test Environment (CASTE) will provide connectivity to existing capabilities and add needed networks and hardware to develop a C4I test bed. Operational Facilities (OPFACs) for Link-16 Weapon-Platform Integration (formerly

Link-16 Support) will provide a host platform simulator for C4I testing. Scene Characterization and Reconstruction for Advanced Munitions (SCRAM) will measure, characterize, and reconstruct high fidelity multispectral target scenes. Test Control & Visualization will upgrade telemetry systems and network infrastructure to handle higher data rates. Armament and Munitions Digital Modeling and Simulation will develop, verify, and validate a standard set of reusable models and simulations to support armament and munitions T&E. These projects ensure test center technology is compatible with weapon systems to be tested such as Advanced Medium Range Air-to-Air Missile (AMRAAM), Joint Direct Attack Munition (JDAM), Advanced Short Range Air-to-Air Missile (ASRAAM), AGM-130, Joint Tactical Information Distribution System (JTIDS), Joint Surveillance Target Attack Radar System (JSTARS), Combat Talon, etc.. Over-Water Impact Scoring System (OWISS) will extend instrumentation capabilities into the Gulf of Mexico to permit testing of large footprint weapon systems.

AEDC, located at Arnold AFB, TN, provides pre-flight ground environmental test support for DoD aeropropulsion, flight systems, and space and missile programs. The center has 53 test facilities providing: aerodynamic testing of scale model aircraft, missiles, 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 Improve Turbine Engine Structural Integrity (ITESI) 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. Real-Time Display and Analysis System (RDAS) will provide upgraded displays and analysis systems to several key test facilities to help achieve a portion of AEDC's vision of integrating test/plant/utilities operations. The Enhance Turbine Engine Installation and Productivity (formerly JSF STOVL Engine Test Cells Upgrade) will modernize the sea level test cells (SL2 and SL3) transferred from Trenton NAS under BRAC and installed at AEDC. These cells will be upgraded for environmental and structural endurance testing of the Joint Strike Fighter (JSF) and other aircraft engines, F119/F120 derivatives. Propulsion Consolidation and Streamlining (PC&S) program invests in modernization of AEDC jet engine test capability by consolidating major industrial aeropropulsion test facilities, improving plant and test cell reliability, increasing test cell capability, and streamlining test processes.

AFFTC, located at Edwards AFB, CA, conducts and supports DT&E and OT&E of aircraft and aircraft systems, aerospace research vehicles, unmanned aerial vehicles, cruise missiles, parachute delivery/recovery/systems, and cargo handling systems. The Modeling and Simulation T&E Resources (MASTER) program is a joint development effort between AFFTC and AEDC. The goal is for the two centers to integrate modeling and simulation (M&S) more closely to ground and open-air range flight test to reduce the cost and time of developmental testing. MASTER has been divided into five separate development efforts to meet this goal: the Consolidated Model and Data Repository; the development of a Configuration Management, Scheduling and Asset Tracking System; the Propulsion Data Validation and Analysis System; the Store Separation Simulation Capability and the Fluid Structural Interaction Capability project. The Advanced Range Telemetry (ARTM) Integration project will procure and integrate improved range telemetry instrumentation, aircraft instrumentation suites, and ground support systems. It also provides a quick reaction capability for future weapon systems and enhancements required by AFFTC customers. The Advanced GPS Range Sensors (AGRS) project will provide increased Time, Space, Position Information (TSPI) accuracy and data link capabilities for pod and internal mount configurations. These objectives will be accomplished by integrating state of the art GPS and data transfer commercial-off-the-shelf (COTS) equipment, upgrading software to provide high accuracy kinematics GPS processing and near-real-time data processing, and utilizing the Enhanced Range Application Program (EnRAP) Follow-on Central Test and Evaluation Investment Program (CTEIP) project to procure tri-service interoperable GPS and datalink equipment. DPMSIP will provide a common system for real-time data display, near-real-time analysis, and post-test analysis. DPMSIP will also be compliant with current modeling and simulation data interface standards. The Next Generation Instrumentation (NexGenInst) project will upgrade instrumentation systems on test and test support aircraft in addition to improving the ground

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2008
BUDGET ACTIVITY 06 RDT&E Management Support	PE NUMBER AND TITLE 0604759F Major T&E Investment

support systems used to program and preflight these systems and the AFFTC modification program management capability. The AFFTC Range Systems Upgrade (ARSU) program will provide upgrades to the current open air range systems to support future range programs in four specific areas: range communications, range imaging/display, range safety/surveillance, and command/control.

Det 12, SMC, located at Kirtland AFB, NM, is the primary provider of launch capability, spaceflight, and on-orbit operations demonstrating transformation technologies and managing the Space Test Program, Rocket Systems Launch Program, and RDT&E Space and Missile Operations Program. Next Generation Satellite Telemetry, Tracking, & Control (Nxt Gen Sat TT&C) will modernize the Kirtland AFB to Schriever AFB communication link to provide greater throughput and a sustainable baseline. The program replaces obsolete satellite COTS based C2 hardware and software components. Integrate X-Band and Unified S-Band antenna support capabilities, commercial and NASA resources. Nxt Gen Sat TT&C also replaces obsolete data recording and data trending systems.

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.

(U) B. Program Change Summary ($ in Millions)

		FY 2007	FY 2008	FY 2009
(U)	Previous President's Budget	61.671	59.064	62.333
(U)	Current PBR/President's Budget	63.417	63.855	61.818
(U)	Total Adjustments	1.746		
(U)	Congressional Program Reductions			
	Congressional Rescissions		-0.409	
	Congressional Increases		5.200	
	Reprogrammings	1.746		
	SBIR/STTR Transfer			
(U)	Significant Program Changes:			

FY07: $1.746M actuals layin.

FY08: Congressional Action plus of $5.2M ($3.6M for Holloman High Speed Test Track and $1.6M for FPS-16 Radar Mobilization Upgrade). Congressional rescissions of $-0.409M.

Exhibit R-2a, RDT&E Project Justification

DATE **February 2008**

BUDGET ACTIVITY **06 RDT&E Management Support**

PE NUMBER AND TITLE **0604759F Major T&E Investment**

PROJECT NUMBER AND TITLE **4597 Air Force Test Investments**

Cost ($ in Millions)	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total
4597 Air Force Test Investments	63.417	63.855	61.818	63.232	66.688	67.934	68.770	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

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Exhibit R-2a, RDT&E Project Justification		DATE February 2008
BUDGET ACTIVITY 06 RDT&E Management Support	PE NUMBER AND TITLE 0604759F Major T&E Investment	PROJECT NUMBER AND TITLE 4597 Air Force Test Investments

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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.

	B. Accomplishments/Planned Program ($ in Millions)	FY 2007	FY 2008	FY 2009
(U)	46 Test Wing, Air Armament Center			
(U)	Armament and Munitions Digital Modeling and Simulation (AMD M&S): Develops and coordinates Modeling and Simulation Master Plan and Modeling and Simulation activities.	3.536	3.379	2.979
(U)	Advanced Airborne Instrumentation Integration (AAII): Acquires and integrates state-of-the-art airborne instrumentation such as Advanced Common Airborne Instrumentation System (CAIS) and Advanced Range Telemetry System (ARTM). Acquires ground support equipment to support pre/post flight operations.	6.232		
(U)	Test Control & Visualization (TCV): Upgrades telemetry (TM) systems and network infrastructure to handle higher data rates. Acquires and integrates real-time computing servers, data recorders, and video displays.	1.469		
(U)	C4I Advanced Simulation and Test Environment (CASTE): Acquires equipment, instrumentation, hardware, software, and connectivity for C4I testing.	0.881		
(U)	Over Water Impact Scoring System (OWISS): Develops the capability necessary to test long-range precision strike munitions in an overwater environment.	5.832	1.423	2.979
(U)	C4ISR Modeling and Simulation: Acquires and develops comprehensive digital models and integrates real and synthetic environments to provide a realistic battlespace for testing C2 systems.	0.903	2.462	3.731
(U)	Command and Control Test Operations Center (C2TOC): Develops a Joint Air Operations Center level test capability to conduct functional, performance and load/stress testing on C2 Weapons Systems.	1.619	2.187	2.483
(U)	Advanced Range Telemetry System (ARTM): Improves and upgrades critical telemetry infrastructure for higher throughput rates. Improves quality of real-time data and more efficient utilization of the frequency spectrum.	2.906	4.176	4.866
(U)	Operational Ground Test Facility (OGT): OGT is a required capability to test munitions in their operational environment. OGT is a hardware in the loop simulation with IR/UV/optical scene generators adding vibration, temperature and climatic variables to the simulation.	0.531	2.537	3.029
(U)	Advanced Command Destruct System (ACDS): Improves & upgrades existing command destruct (aka flight termination) systems utilizing state-of-the-art datalink & encryption technologies to provide a robust & secure destruct commands to in-flight weapon systems.		2.042	1.837
(U)	Advanced Munitions Test Improvements (AMTI): Develops new HITL capabilities to permit the testing of advanced		1.537	2.483

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BUDGET ACTIVITY 06 RDT&E Management Support	PE NUMBER AND TITLE 0604759F Major T&E Investment	PROJECT NUMBER AND TITLE 4597 Air Force Test Investments

	B. Accomplishments/Planned Program ($ in Millions)	FY 2007	FY 2008	FY 2009
	technology guidance, control, and signal processing techniques employed in the next generation weapon systems.			
(U)	Ultra High-Accuracy Reference System (UHARS): Develops a high-accuracy inertial based TSPI system to meet the position & velocity requirements of advanced weapon systems and their navigation systems, and enables weapon system testing in GPS-denied environments.		0.500	1.000
(U)	Eglin Air Armament Center: This was an FY07 Congressional Plus-up for Enterprise Test Data Management System (ETDMS.) ETDMS will facilitate effective management of large volumes of data; increase T&E efficiency; reduce time-delays and costs; foster effective data sharing between govt and contractors; and posture 46TW to receive and process data from operational units, bolstering warfighter effectiveness. This proposal directly supports current and upcoming test programs: F-22A, C-17, C-130J, C-130 AMP, F-16, B-1, B-52, B-2, J-UCAS.	2.000		
(U)	Air Force Flight Test Center			
(U)	Advanced GPS Range Sensors (AGRS): Acquire and integrate hardware necessary for the continued development of intenal mount GPS/IMU TSPI sensors. Acquire and integrate low cost TSPI data link. Upgrades and delivers high accuracy kinematic GPS TSPI processing software. Provides consolidated inputs from AF test ranges to the Range Instrumentation System Program Office (RISPO) for GPS and data link equipment to be developed under the Common Range Integrated Instrumentation System (CRIIS) program. Provide and integrate replacement subsystems that will extend the service life of the Advanced Range Data System at AAC and AFFTC.	5.143	7.202	1.427
(U)	Next Generation Test Instrumentation: Integrates new measurement technology into multiple aircraft and support labs. Provides enhancements and improvements to the Internet based Instrumentation Management Information Systems to improve modification cost accounting and program management. Expands the capabilities of ILIAD to program multiple vendor hardware suites and preflight test articles and airframes. Develops airborne instrumentation components to address new sensor interfaces. Purchases instrumentation components to upgrade obsolete and unreliable instrumentation components. Replaces obsolete data systems (Airborne Test Instrumentation System, Metraplex) and unreliable data recorders on Test aircraft, support fleet, and Test Pilot School aircraft.	2.628		
(U)	AFFTC Range System Upgrade (ARSU). Expand the range digital voice communication system to meet increasing customer requirements. Implement range data command and control system to automate the setup, configuration, monitoring and reconfiguration of networks and widely dispersed end equipment supporting data, telemetry, voice, video and other real-time and non-real time data thereby increasing the number and quality of missions supported.	0.200	0.200	3.829
(U)	AFFTC RT & Post Flight System Upgrade (ARPSU): Upgrades the TM processing to handle new data formats and increased data rates. Upgrades the data distribution network that transfers data from multiple data sources into the control rooms. Implements solutions for bi-directional TM (being developed under CTEIP programs) into the control rooms which increases the speed and capacity of the data analysis systems.	2.606	5.018	5.371
(U)	AFFTC TSPI System Upgrade (ATSU): Acquires and implements non-GPS based TSPI solutions. Develops an	2.803	3.854	4.308

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE
06 RDT&E Management Support	**0604759F Major T&E Investment**	**4597 Air Force Test Investments**

	B. Accomplishments/Planned Program ($ in Millions)	FY 2007	FY 2008	FY 2009
	automated TSPI architecture. Continues enhancements to the GPS based TSPI system systems to provide for the integration of new codes and frequencies.			
(U)	Joint Airborne Instrumentation Integration (JAII): Develops state-of-the-art data acquisition and transmission systems with data rate capacity of 500-1000 MB/sec, solid state and 3-D recorders capable of storing terabytes of data, spectrum efficient and spectrum agile packetized data telemetering transmitters for global battlespace testing, airborne separation video equipment capable of color megapixel resolution in both the visible and Infrared (IR) spectrum, reference airborne time sources generated from current TSPI standards and integrates Range time and position equipment into test airframes.		4.521	6.944
(U)	Enterprise Test Data Management: This was an FY07 Congressional Plus-up	1.400		
(U)	Arnold Engineering Development Center			
(U)	Real Time Display and Analysis System (RDAS): Designs, procures, installs, checks out and turns over the J2 and J1 Test Unit Supervisory Systems (TUSS), 4T Test Article Control System, SL2 TUSS, C1 TUSS, 4T Pretest System, and SL3 TUSS. Integrates checkout and turnover of the 4T Data Acquisition Processing Systems (DAPS). Designs and procures activities for the 4T Plant Automation effort. Installs and checks out the 4T Test System.	2.523	1.734	
(U)	Propulsion Consolidation and Streamlining (PC&S): Improves plant and test cell reliability, increasing test cell capability, and streamlining test processes of the jet engine test facility.	10.156		
(U)	VKF Plant Modernization: Provides pressurized air support for hypersonic wind tunnel and turbine engine test requirements.	3.385	3.854	4.786
(U)	Tunnel 4T Modernization: 1) Upgrade the flex nozzle actuators & control system; 2) Modernize the Captive Trajectory System; 3) Process air control valve (65A) Analysis/Relocation; 4) Provide commonality of 4T data systems with ABC data systems; 5) Increase Mach to 2.5; 6) Electrical distribution within cover building; 7) Test Section Upgrades; 8) Add a portable Pressure Sensitive Paint (PSP) system.		2.322	3.264
(U)	Tunnels A/B/C Modernization: 1) Replace/Modernize the Tunnel A, flex nozzle and diffuser, actuators & controls and perform calibrations to validate nozzle contours; 2) Construct a central facility operations center for efficient test execution; 3) Upgrade/Modernize classified/unclassified network, security and computer & data acquisition systems.		5.105	5.744
(U)	Other Projects			
(U)	Next Generation Satellite TT&C (Nxt Gen Sat TT&C): Modernizes the Kirtland AFB to Schriever AFB communication link to provide greater throughput and a sustainable baseline. Replaces obsolete satellite COTS based C2 hardware and software components. Integrates X-Band and Unified S-Band antenna support capabilities, commercial and NASA resources. Replaces obsolete data recording and data trending systems.	4.301	3.390	
(U)	T&E Board of Directors Support: Coordinates tri-service investment efforts. Coordinates joint Reliance documents.	0.150	0.117	0.082

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	B. Accomplishments/Planned Program ($ in Millions)	FY 2007	FY 2008	FY 2009
(U)	Technology Insertion & Risk Reduction (TIRR): Short Focal Length Collimator (SFLC) will enable full Field-of-View (FOV) testing of space-based space surveillance & radience-based sensors. HHSTT Rainfield Enhancement will improve methodologies for quantifying weather environments impact on missile systems. Sub-miniature EFTS & FTSA will produce miniaturized flight termination components necessary to the SFSS CTEIP program.	0.467	1.504	1.191
(U)	Total Cost	61.671	59.064	62.333

(U) C. Other Program Funding Summary ($ in Millions)

	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	Cost to Complete	Total Cost
(U) Other APPN									

Related RDT&E: PE 0604256F, Threat Simulator Development; PE 0604940D, Central Test and Evaluation Investment Program; PE 0605804D, Development Test and Evaluation; PE 0603941D, Test and Evaluation Science and Technology; PE 0605807F, Test and Evaluation Support; PE 0605978F, Facilities Sustainment - T&E Support; and PE 0605976F, Facility Restoration and Modernization.

(U) D. Acquisition Strategy

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.