

UNCLASSIFIED

PE NUMBER: 0604759F
PE TITLE: Major T&E Investment

Exhibit R-2, RDT&E Budget Item Justification								DATE May 2009		
BUDGET ACTIVITY 06 RDT&E Management Support					PE NUMBER AND TITLE 0604759F Major T&E Investment					
Cost (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost to Complete	Total
Total Program Element (PE) Cost	62.635	69.221	60.824	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
4597 Air Force Test Investments	62.635	69.221	60.824	0.000	0.000	0.000	0.000	0.000	Continuing	TBD

(U) A. Mission Description and Budget Item Justification

This PE provides planning, improvements, and modernization for test capabilities at three Air Force test organizations: 46 Test Wing (to include 46 Test Group at Holloman AFB NM, and operating locations at Wright-Patterson AFB OH), Arnold Engineering Development Center (AEDC), and Air Force Flight Test Center (AFFTC). The purpose is to help test organizations improve their test infrastructure and capabilities to keep pace with improvements in weapon system technologies. Test investment activities also fund the Test and Evaluation (T&E) Board of Directors and the Technology Insertion & Risk Reduction (TIRR) program, formerly the Test Technology Development (TTD) program. The TIRR program provides funds to study 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 risk associated with new technologies and methodologies prior to investing in larger programs.

The improvement and modernization (I&M) requirements are 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, equipment installation, and checkout phases which often require significant differences in funding from one year to the next. As such, the changes in category 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, but are available to others requiring their unique capabilities.

The 46TW, at Eglin AFB, FL, conducts and supports developmental test and evaluation (DT&E) of non-nuclear air armaments; Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) systems; target acquisition and weapon delivery systems; navigation systems; provides a climatic simulation capability; and determines target/test item spectral signatures. The 46TG at Holloman AFB, NM provides test facilities for high-speed sled track testing, that simulates selected portions of the flight environment.

AEDC, at Arnold AFB, TN, provides pre-flight and reliability 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.

AFFTC, at Edwards AFB, CA, conducts and supports DT&E and Operational Test and Evaluation (OT&E) of aircraft and aircraft systems, aerospace research

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vehicles, unmanned aerial vehicles, cruise missiles, parachute delivery/recovery/systems, and cargo handling systems. I&M efforts within this PE are identified in four mission area categories: Airframe/Propulsion/Avionics (APA); Armament/Munitions (A/M); Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR); and Space. These categories describe general types of effort that will be conducted in this PE. TIRR funding is included in all categories. APA provides planning, improvements, and modernization needed for test capabilities to conduct and support DT&E and OT&E of aircraft and aircraft systems, aerospace research vehicles, unmanned aerial vehicles, cruise missiles, parachute delivery/recovery systems, cargo handling systems, and turbine engines. A/M provides planning, improvements and modernization to conduct DT&E of air-to-ground and air-to-air armaments and munitions, which include gun, chaff and flare systems as well as aerial decoy and target systems. The A/M category encompasses the full range of DT&E from digital modeling and simulation, to precision measurement testing, to hardware-in-the-loop and installed systems testing, to open-air range testing. Elements of A/M DT&E include environmental, warhead effectiveness, arena blast/fragmentation, guidance navigation and control, aerodynamics, propulsion, electromagnetic interference and compatibility, mass properties, seeker and signature measurement, survivability, lethality, integration, reliability, net-centric and terminal effects testing. A/M also involves the design and development of systems needed to support A/M DT&E including the design and development sleds, targets, range support systems and various instrumentation and measurement systems. C4ISR provides planning, improvements and modernization to conduct DT&E of systems that support C2 functions which range from air campaign planning at the theater level to wing level C2 operations, to planning individual missions, to putting weapons on target using concepts such as machine to machine targeting. C4ISR includes ground and flight performance testing of airborne C2 networks and tactical data links, air operation centers, mission planning systems, multi-level security systems, radio and communication systems, ISR systems, information assurance systems, and radar systems such as those used by JSTARS and air traffic control systems. C4ISR conducts DT&E on a full range of systems covering the sensor (detection) to the shooter (weapon), including functional and environmental testing of these systems. Space provides planning, improvements, and modernization needed for Space test capabilities to perform developmental and operational testing for space and launch acquisition and sustainment programs. Test capabilities include launch vehicle, satellite, missile, sensor, thermal protection system, signature, hardness, and interface testing. The capabilities are resident at Vandenberg, Kirtland, Arnold, Patrick, Schriever, Peterson, Holloman Air Force Bases and others. Infrastructure includes launch sites, mobile control units, thermal vacuum chambers, sled track, arc heated wind tunnels, ballistic test ranges, signature collection, and the requisite personnel. 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.		

Exhibit R-2, RDT&E Budget Item Justification

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BUDGET ACTIVITY

06 RDT&E Management Support

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

	<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
(U) Previous President's Budget	63.855	61.818	63.232
(U) Current PBR/President's Budget	62.635	69.221	60.824
(U) Total Adjustments	-1.220	7.403	
(U) Congressional Program Reductions			
Congressional Rescissions		-0.197	
Congressional Increases		7.600	
Reprogrammings			
SBIR/STTR Transfer	-1.220		

(U) **Significant Program Changes:**

FY09 Congressional increases for FPS-16 Mobilization Upgrade \$2.8M, Holloman High Speed Test Track \$4.0M, and Range Ops Upgrades \$.8M.

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4597 Air Force Test Investments

Cost (\$ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost to Complete	Total
4597 Air Force Test Investments	62.635	69.221	60.824	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0		

(U) **A. Mission Description and Budget Item Justification**

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AFFTC, at Edwards AFB, CA, conducts and supports DT&E and Operational Test and Evaluation (OT&E) of aircraft and aircraft systems, aerospace research vehicles, unmanned aerial vehicles, cruise missiles, parachute delivery/recovery/systems, and cargo handling systems.

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I&M efforts within this PE are identified in four mission area categories: Airframe/Propulsion/Avionics (APA); Armament/Munitions (A/M); Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR); and Space. These categories describe general types of effort that will be conducted in this PE. TIRR funding is included in all categories. APA provides planning, improvements, and modernization needed for test capabilities to conduct and support DT&E and OT&E of aircraft and aircraft systems, aerospace research vehicles, unmanned aerial vehicles, cruise missiles, parachute delivery/recovery systems, cargo handling systems, and turbine engines. A/M provides planning, improvements and modernization to conduct DT&E of air-to-ground and air-to-air armaments and munitions, which include gun, chaff and flare systems as well as aerial decoy and target systems. The A/M category encompasses the full range of DT&E from digital modeling and simulation, to precision measurement testing, to hardware-in-the-loop and installed systems testing, to open-air range testing. Elements of A/M DT&E include environmental, warhead effectiveness, arena blast/fragmentation, guidance navigation and control, aerodynamics, propulsion, electromagnetic interference and compatibility, mass properties, seeker and signature measurement, survivability, lethality, integration, reliability, net-centric and terminal effects testing. A/M also involves the design and development of systems needed to support A/M DT&E including the design and development sleds, targets, range support systems and various instrumentation and measurement systems. C4ISR provides planning, improvements and modernization to conduct DT&E of systems that support C2 functions which range from air campaign planning at the theater level to wing level C2 operations, to planning individual missions, to putting weapons on target using concepts such as machine to machine targeting. C4ISR includes ground and flight performance testing of airborne C2 networks and tactical data links, air operation centers, mission planning systems, multi-level security systems, radio and communication systems, ISR systems, information assurance systems, and radar systems such as those used by JSTARS and air traffic control systems. C4ISR conducts DT&E on a full range of systems covering the sensor (detection) to the shooter (weapon), including functional and environmental testing of these systems. Space provides planning, improvements, and modernization needed for Space test capabilities to perform developmental and operational testing for space and launch acquisition and sustainment programs. Test capabilities include launch vehicle, satellite, missile, sensor, thermal protection system, signature, hardness, and interface testing. The capabilities are resident at Vandenberg, Kirtland, Arnold, Patrick, Schriever, Peterson, Holloman Air Force Bases and others. Infrastructure includes launch sites, mobile control units, thermal vacuum chambers, sled track, arc heated wind tunnels, ballistic test ranges, signature collection, and the requisite personnel. 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. Accomplishments/Planned Program (\$ in Millions)		<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
(U) CATEGORY: Airframe/Propulsion/Avionics (APA) - provides planning, improvements, and modernization needed for test capabilities to conduct and support DT&E and OT&E of aircraft and aircraft systems, aerospace research vehicles, unmanned aerial vehicles, cruise missiles, parachute delivery/recovery systems, cargo handling systems, and turbine engines.		38.097	42.355	39.699
(U) Advanced GPS Range Sensor (AGRS): This project develops improved aircraft internal mount Time Space Position				

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(U) B. Accomplishments/Planned Program (\$ in Millions)		<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
Information (TSPI) systems, develops or acquires replacement subsystems for the aging Advanced Range Data System (ARDS) equipment and provides improvements to TSPI data processing software to support the AFFTC and AAC requirements for increasing TSPI accuracies.				
(U) AFFTC Real-Time & Post-Flight System Upgrade (ARPSU): This project develops improved real-time and post flight telemetry (TM) data processing and display systems capable of handling increased data rates, and next generation networked TM capabilities. Integrates newly developed capabilities to enhance AFFTC mission control rooms.				
(U) AFFTC TSPI Systems Upgrade (ATSU): This project continues to provide enhancements to AFFTC aircraft internal mount GPS-based TSPI systems to accommodate new formats, codes and frequencies planned for modernized GPS satellite constellation. Also develops capability to provide TSPI data on non-cooperative test articles and targets. Develops capability to provide correction data to internal mount airborne TSPI sensors for increasing accuracy requirements.				
(U) AFFTC Range Systems Upgrade (ARSU): This project will upgrade mission critical range systems: real-time data transport, flight safety/surveillance, imaging/display system, voice/data/video communication, and command/control network management. Upgrades are required to overcome near-term obsolescence issues and implement new/extend existing capabilities to meet range requirements to support of current and future AFFTC programs.				
(U) Joint Airborne Instrumentation Integration (JAII): This project provides AFMC with instrumented airborne weapon system platforms in support of aircraft and armament development and flight testing. It procures, develops, and integrates state-of-the-art airborne data acquisition, recording and transmission systems and associated support equipment to keep pace with requirements for increased data rates, higher accuracy, and improved spectrum efficiency.				
(U) Telemetry Systems Integration & Support (TSIS): This project will procure and integrate improved range telemetry acquisition systems, aircraft instrumentation suites, and ground support systems (GSS) to network telemetry systems. TSIS will support Integrated Network Enhanced Telemetry (iNET) frequency reuse with improved frequency management infrastructure.				
(U) von Karman Gas Dynamics Facility (VKF) Plant Modernization: This AEDC project upgrades the VKF Plant, which provides process air support for the supersonic and hypersonic wind tunnels and pressurized air support to the arc heated test cells, aeropropulsion test cells, propulsion wind tunnels and the Aeropropulsion Test Unit. The VKF plant infrastructure controls and rotating equipment will be modernized with digital control and a variable frequency starting system. The improved reliability and operational efficiencies will result in overall cost reductions for the VKF Plant.				
(U) Tunnel 4T Modernization: This project upgrades the flex nozzle actuators & control system; modernizes the Captive				

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Exhibit R-2a (PE 0604759F)

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Trajectory System; processes air control valve (65A) Analysis/Relocation; provides commonality of 4T data systems with ABC data systems; increases Mach number capability to 2.5; provides electrical distribution within cover building; provides test section upgrades; and adds a portable Pressure Sensitive Paint (PSP) system.				
(U) Real-Time Display & Analysis (RDAS): This project will increase the level of reliability, availability, and maintainability of test facilities' infrastructure while reducing technological and operational risks, air-on-time and test cost. This effort will incrementally improve the facility capabilities by upgrading data systems, operational control rooms, and test unit supervisory systems in AEDC major Test Cells (J1, J2, C1, C2, SL2 and 4T).				
(U) Tunnels ABC Modernization: The VKF supersonic/hypersonic wind tunnels A/B/C will be modernized to provide technologically superior operation, measurement, and simulation capabilities. The specific enhancements include: automation of test section controls, construction of an advanced centralized facility control room for efficient and productive test execution and upgraded non-intrusive flow visualization and diagnostics.				
(U) Advanced Large Military Engine Capability: This project modernizes AEDC's large military engine test capability and includes a foundation for supporting future high speed propulsion system testing. This enhanced capability will address current test envelope restrictions and increase reliability of the only air supply system for all engine test cells at AEDC. The project scope includes upgrading the C-Plant air supply heaters, improving the six major test cells' exhaust coolers and sprays, and modernizes other critical, problematic facility and test cell systems necessary for large military engine testing.				
(U) Advanced Small Military (High Speed) Engine Capability: This project will upgrade the AEDC Aeropropulsion Test Cell T3 to provide continuous flow, true flight condition for testing of advanced high speed air-breathing engines and components. This project will correct current facility and test cell limitations and restrictions for this high temperature, high pressure operation. Major upgrades will be accomplished on the facility and test cell operational controls, the data acquisition systems, the test cell instrumentation, the supply air heater capability and reliability, and the treatment of the high temperature test cell exhaust.				
(U) Ultra High Accuracy Reference System (UHARS): This project develops a high-accuracy inertial-based TSPI system to meet the position and velocity requirements of advanced weapon systems and their navigation systems, and enables weapons system testing in GPS-denied environments.				
(U) Holloman High-Speed Test Track / Maglev: This project supports development of a magnetically levitated rocket sled test capability at Holloman AFB, where the ultimate goal is to develop a Mach 10 ground test capability providing a realistic flight type environment for testing hypersonic propulsion systems, missile seekers/sensors, warheads, etc.				
(U) Holloman High-Speed Test Track (HHSTT)/Rainfield Enhanced Testing (TIRR): This project provides increased control and measurement of rain environments at the HHSTT to more closely replicate natural rainfall and provide				

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better data for rain erosion model validation, and will also study and model the microscale wind environment and design wind mitigation structures to minimize the effect of wind on the rain environment during sled tests.				
(U) CATEGORY: Armament/Munitions (A/M) - provides planning, improvements and modernization to conduct DT&E of air-to-ground and air-to-air armaments and munitions, which include gun, chaff and flare systems as well as aerial decoy and target systems. The A/M category encompasses the full range of DT&E from digital modeling and simulation, to precision measurement testing, to hardware-in-the-loop and installed systems testing, to open-air range testing. Elements of A/M DT&E include environmental, warhead effectiveness, arena blast/fragmentation, guidance navigation and control, aerodynamics, propulsion, electromagnetic interference and compatibility, mass properties, seeker and signature measurement, survivability, lethality, integration, reliability, net-centric and terminal effects testing. A/M also involves the design and development of systems needed to support A/M DT&E including the design and development sleds, targets, range support systems and various instrumentation and measurement systems.		17.132	20.570	17.254
(U) Armament/Munitions Digital Modeling & Simulation (A/M DM&S): This project modernizes and improves modeling, simulation and analysis capabilities to support comprehensive test and evaluation of developmental air armament systems, with the goal of integrating the models developed by laboratories, center components, and contractors into a common suite of reusable tools.				
(U) Over-Water Impact Scoring System (OWISS): This project develops the capability necessary to test long-range precision strike weapons in an overwater environment. It extends range instrumentation systems and tracking coverage into the Gulf of Mexico, along remote shoreline locations, and at terminal impact locations to support test and evaluation of long-range, net-centric weapons having large hazardous weapon footprint profiles.				
(U) Advanced Munitions Test Improvement (AMTI): This project develops new hardware-in-the-loop (HITL) capabilities to permit testing of advanced technology guidance, control and signal processing techniques employed in the next generation weapon systems. AMTI will provide required test capabilities for next generation weapon systems that incorporate state-of-the-art technologies such as advanced GPS, hyperspectral imaging, laser detection and ranging, and low observable sensor technology.				
(U) Advanced Range Telemetry (ARTM): This project will acquire and upgrade critical telemetry (TM) equipment and infrastructure needed to obtain higher throughput data rates, enhance coverage area, improve the quality of real-time data, provide more efficient use of the frequency spectrum, and broaden network bandwidth at Eglin AFB's ground station TM sites.				
(U) Operational Ground Test (OGT): This project develops a required capability to test munitions in an all-up-round (AUR) configuration in their operational environment. OGT allows for non-destructive repeatable DT&E of AUR weapons to support failure mode analyses.				
(U) Advanced Command Destruct System (ACDS): This project improves and upgrades existing command destruct (i.e.				

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(U) B. Accomplishments/Planned Program (\$ in Millions)		<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>
flight termination) systems using state-of-the-art datalink and encryption technologies to provide a more robust, secure and sustainable command and destruct system that is used to send on-demand flight-termination signals/commands to in-flight weapon systems.				
(U) Gulf Range Test & Training Control Center (GRTTCC): This project provides modernization of computational systems used to convert complex data streams from Eglin's highly integrated T&E complex into usable information to support test customers, and includes integration of range data systems, data networks, data storage capabilities and display equipment to leverage advances in computer and communications technologies.				
(U) Joint Gulf Range Area Network Development (JGRAND): This project provides expansion of the existing fiber optic network to incorporate up to 44 test sites within the Eglin Gulf Range Complex (EGRC), implements hardware and software upgrades across the EGRC to support the Test and Evaluation Enabling Architecture initiative, and provides an advanced mobile fiber optic and microwave communications capability to accommodate instrumentation temporarily placed in hazardous and/or remote test footprint areas.				
(U) FPS-16 Radar Mobilization Upgrade: This project will transform a fixed radar platform to a transportable system to extend range instrumentation and tracking coverage into the Gulf of Mexico, along remote shoreline locations, and at terminal impact locations to support test and evaluation of long-range, net-centric weapons having large hazardous weapon footprint profiles.				
(U) Eglin AFB Range Operations Control Center Upgrade: This project will implement new technologies to improve range control capability for a planned increase in flight operations and ground missions. Upgrades will improve command/control network, flight safety and display systems.				
(U) CATEGORY: Command, Control, Communications, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) - provides planning, improvements and modernization to conduct DT&E of systems that support C2 functions which range from air campaign planning at the theater level to wing level C2 operations, to planning individual missions, to putting weapons on target using concepts such as machine to machine targeting. C4ISR includes ground and flight performance testing of airborne C2 networks and tactical data links (e.g. Link 16, JTIDS, SADL, TTNT, etc.), air operation centers, mission planning systems, multi-level security systems, radio and communication systems, ISR systems, information assurance systems, and radar systems such as those used by JSTARS and air traffic control systems. C4ISR conducts DT&E on a full range of C2 systems covering the sensor (detection) to the shooter (weapon), including functional and environmental testing of these systems.		3.649	6.214	3.783
(U) C4ISR Modeling & Simulation (C4ISR M&S): This project provides the capability to combine synthetic and real-world data to analyze a C4I system's response to operational load. It will acquire, verify and validate models and simulations to support C4ISR T&E involving large-scale, multi-service, multiple force (friendly, neutral and hostile) scenarios.				

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(U)	<u>B. Accomplishments/Planned Program (\$ in Millions)</u>						<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>		
(U)	Command & Control Test Operations Center (C2TOC): This project develops a Joint Air Operations Center level test capability to conduct functional, performance and load/stress testing on C2 weapons systems.										
(U)	CATEGORY: Space - provides planning, improvements, and modernization needed for Space test capabilities to perform developmental and operational testing for space and launch acquisition and sustainment programs. Test capabilities include launch vehicle, satellite, missile, sensor, thermal protection system, signature, hardness, and interface testing. The capabilities are resident at Vandenberg, Kirtland, Arnold, Patrick, Schriever, Patterson, Holloman Air Force Bases and others. Infrastructure includes launch sites, mobile control units, thermal vacuum chambers, sled track, arc heated wind tunnels, ballistic test ranges, signature collection, and the requisite personnel.						3.640	0.000	0.000		
(U)	Next Generation Satellite TT&C (Next Gen Sat TT&C): Modernizes the Kirtland AFB to Schriever AFB communication link to provides 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 trading systems.										
(U)	Technology Insertion & Risk Reduction (TIRR): Short Focal Length Collimator (SFLC) will enable full Field-of-View (FOV) testing of space-based surveillance & radiance-based sensors. HHSTT Rainfield Enhancement will improve methodologies for quantifying weather environments impact on missile systems.										
(U)	OTHER PROJECTS										
(U)	T&E Board of Directors: Coordinates Tri-Service investment efforts. Coordinates Joint T&E Reliance efforts.						0.117	0.082	0.088		
(U)	Total Cost						62.635	69.221	60.824		
(U)	<u>C. Other Program Funding Summary (\$ in Millions)</u>										
		<u>FY 2008</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost to</u>	<u>Total Cost</u>
		<u>Actual</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Estimate</u>	<u>Complete</u>	
(U)	Other APPN										
	Related RDT&E: PE 0604256F, Threat Simulator Development; PE 0604940D, Central Test and Evaluation Investment Program; PE 0605814OTE Operational Test Activities and Analysis; 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)	<u>D. 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.										

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