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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force										DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 6: <i>RDT&E Management Support</i>				R-1 ITEM NOMENCLATURE PE 0604759F: <i>Major T&E Investment</i>							
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	67.898	67.797	61.587	0.000	61.587	62.413	62.553	62.029	61.250	Continuing	Continuing
664597: <i>Air Force Test Investments</i>	67.898	67.797	61.587	0.000	61.587	62.413	62.553	62.029	61.250	Continuing	Continuing
A. Mission Description and Budget Item Justification											
<p>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 and develop 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.</p> <p>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.</p> <p>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 independent test and evaluation of inertial, Global Positioning System and integrated systems used for aircraft navigation and missile guidance systems including vulnerability to electronic interference; provides the liaison function for coordinating and scheduling all US Air Force test operations at White Sands Missile Range; and executes flight test and test support for advanced avionics and weapons development of joint, international and commercial test programs.</p>											

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<p>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.</p> <p>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.</p> <p>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.</p> <p>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. APA focuses on evaluation of the vehicle airframe, propulsion system, and avionics systems, as well as overall systems integration testing. It encompasses both ground test facilities and open-air range infrastructure, including instrumentation and data processing.</p> <p>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.</p> <p>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.</p>		

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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.

B. Program Change Summary (\$ in Millions)

	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011 Base</u>	<u>FY 2011 OCO</u>	<u>FY 2011 Total</u>
Previous President's Budget	67.898	60.824	0.000	0.000	0.000
Current President's Budget	67.898	67.797	61.587	0.000	61.587
Total Adjustments	0.000	6.973	61.587	0.000	61.587
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		7.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	0.000	-0.027	61.587	0.000	61.587

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 664597: *Air Force Test Investments*

Congressional Add: *Holloman High-Speed Test Track / Maglev, FPS-16 Radar Mobilization Upgrade, and Eglin AFB Range Operations Control Center Upgrade*

Congressional Add Subtotals for Project: 664597

Congressional Add Totals for all Projects

	<u>FY 2009</u>	<u>FY 2010</u>
Congressional Add Subtotals for Project: 664597	7.433	7.000
Congressional Add Totals for all Projects	7.433	7.000

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Change Summary Explanation

FY10 Congressional Increases: Eglin AFB Range Operation Control Center Upgrade \$2.0M, Holloman High Speed Test Track \$5.0M.
FY11: The FY 2010 President's Budget submittal did not reflect FY 2011 through FY 2015 funding. Therefore, explanation of changes between the two budget positions cannot be made in a relevant manner.

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Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force								DATE: February 2010			
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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
664597: <i>Air Force Test Investments</i>	67.898	67.797	61.587	0.000	61.587	62.413	62.553	62.029	61.250	Continuing	Continuing
Quantity of RDT&E Articles	0	0	0	0	0	0	0	0	0		

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.

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<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>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</p>		

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<p>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.</p> <p>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> <p>B. Accomplishments/Planned Program (\$ in Millions)</p>						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
<p>MAJOR THRUST: Improvement and modernization of the AF capability to test and evaluate Airframe/ Propulsion/Avionics</p> <p><i>FY 2009 Accomplishments:</i> In FY 2009: Supported - AFFTC Real-Time & Post-Flight System Upgrade (ARPSU) to improve flight telemetry data processing; AFFTC Time Space Position Information (TSPI) Systems Upgrade (ATSU) to provide enhancements to aircraft mounted GPS-based TSPI systems; AFFTC Range Systems Upgrade (ARSU) to provide upgrades to overcome near-term obsolescence; Joint Airborne Instrumentation Integration (JAI) to provide T&E updates for instrumented airborne platforms; Telemetry Systems Integration & Support (TSIS) to improve telemetry acquisition systems; von Karman Gas Dynamics Facility (VKF) Plant Modernization upgrades supersonic and hypersonic wind tunnels; Tunnel 4T Modernization upgrades to flex nozzle actuators & control systems; Tunnels ABC Modernization to provide superior wind tunnel operations; Advanced Large Military Engine Capability upgrades T3 for testing of advanced high speed air-breathing engines; Ultra High Accuracy Reference System (UHARS) to develop a high-accuracy inertial-based TSPI; Holloman High-Speed Test Track (HHSTT)/Rainfield Enhanced Testing to provide increased control and measurement of rain environments during sled tests; T&E Board of Directors coordinates Tri-Service investment and Joint T&E Reliance efforts.</p> <p><i>FY 2010 Plans:</i> In FY 2010: Continue to support-ARPSU improvements to flight telemetry data processing; ATSU enhancements to GPS-based TSPI systems; ARSU upgrades to overcome near-term obsolescence;</p>		36.234	38.809	43.507	0.000	43.507

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B. Accomplishments/Planned Program (\$ in Millions)								
				FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
<p><i>FY 2010 Plans:</i> In FY 2010: N/A</p> <p><i>FY 2011 Base Plans:</i> In FY 2011: N/A</p> <p><i>FY 2011 OCO Plans:</i> In FY 2011 OCO: Not applicable.</p>								
Accomplishments/Planned Programs Subtotals				60.465	60.797	61.587	0.000	61.587
				FY 2009	FY 2010			
<p>Congressional Add: Holloman High-Speed Test Track / Maglev, FPS-16 Radar Mobilization Upgrade, and Eglin AFB Range Operations Control Center Upgrade</p> <p><i>FY 2009 Accomplishments:</i> In FY 2009: Supported - Holloman High-Speed Test Track / Maglev development of a magnetically levitated rocket sled test capability at Holloman AFB, NM 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, and warheads; FPS-16 Radar Mobilization Upgrade project transformation of a fixed radar platform to a transportable system to extend range instrumentation and tracking coverage into the Gulf of Mexico at Eglin AFB, FL; Range Operations Control Center Upgrade project to implement new technologies to improve range control for a planned increase in flight operations and ground missions to include improved command/control network, flight safety and display systems, Eglin AFB, FL.</p>				7.433	7.000			

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B. Accomplishments/Planned Program (\$ in Millions)

	FY 2009	FY 2010
<p><i>FY 2010 Plans:</i> In FY 2010: Continue to support - Holloman High-Speed Test Track / Maglev to develop a magnetically levitated rocket sled test capability at Holloman AFB, NM 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, and warheads; Range Operations Control Center Upgrade project implementation of new technologies to improve range control for a planned increase in flight operations and ground missions to include improved command/control network, flight safety and display systems, Eglin AFB, FL.</p>		
Congressional Adds Subtotals	7.433	7.000

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

<u>Line Item</u>	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011</u> <u>Base</u>	<u>FY 2011</u> <u>OCO</u>	<u>FY 2011</u> <u>Total</u>	<u>FY 2012</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• PE 0604256F: <i>Threat Simulator Development</i>	33.951	23.331	21.245	0.000	21.245	22.495	23.337	23.546	22.699	0.000	0.000
• PE 0605807F: <i>Test and Evaluation Support</i>	756.327	749.756	759.868	0.000	759.868	758.259	732.288	748.855	777.809	0.000	0.000

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.

E. Performance Metrics

Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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