Exhibit R-2, PB 2010 Air Force RDT&E Budget Item Justification									DATE: May 2009	
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)					R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology					
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 Cost**
Total Program Element	78.556	56.283	30.056						Continuing	Continuing
6311SP: Advanced Optics and Laser Space Tech	38.079	16.530	0.000						Continuing	Continuing
633150: Advanced Optics Technology	11.275	10.970	0.000						Continuing	Continuing
633151: Lasers and Imaging Development and Integration	19.166	20.513	16.624						Continuing	Continuing
633152: High Power Microwave Development and Integration	10.036	8.270	13.432						Continuing	Continuing

A. Mission Description and Budget Item Justification

This program provides for the development and demonstration of advanced directed energy and optical concepts. In electric lasers, compact, reliable, relatively high power, cost-effective electric laser devices are demonstrated. High power chemical laser enhancements are also developed. Optical imaging/beam control components/techniques are demonstrated. In high power microwaves (HPMs), technologies such as narrowband and wideband devices and antennas are demonstrated. This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing system upgrades and/or new system developments that have military utility and address warfighter needs.

Exhibit R-2, PB 2010 Air Force RDT&E Budget Item Justification	DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	**R-1 ITEM NOMENCLATURE** PE 0603605F Advanced Weapons Technology

B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	74.383	44.507	48.530	
Current BES/President's Budget	78.556	56.283	30.056	
Total Adjustments	4.173	11.776	0.000	
Congressional Program Reductions	0.000	-0.031		
Congressional Rescissions	0.000	-0.153		
Total Congressional Increases	0.000	11.960		
Total Reprogrammings	5.782	0.000		
SBIR/STTR Transfer	-1.609	0.000		

Change Summary Explanation

Funding was increased in FY 2009 for additional demonstrations leading to an earlier transition of tactical directed energy weapon technologies. In FY 2010 several electric laser, relay mirror, and space situational awareness efforts have been moved from this PE into PE 0602605F, Directed Energy Technology, to better reflect the actual technology readiness level of the efforts.

Note: In FY 2009, Congress added $1.2 million for Compound Zoom for Airborne Reconnaissance (CZAR), $0.96 million of Advanced Fiber Lasers Systems and Components, $7.0 million for Applications of LIDAR to Vehicles with Analysis, and $2.8 million for Real-time Optical Surveillance Applications.

C. Performance Metrics
Under Development.

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology					PROJECT NUMBER 6311SP	
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 Cost**
6311SP: Advanced Optics and Laser Space Tech	38.079	16.530	0.000						Continuing	Continuing

Note

Note: In FY 2010, funds from this Project are being moved to Project 3151, Lasers and Imaging Development and Integration, in this PE or Project 4866, Lasers and Imaging Technology, in PE 0602605F, Directed Energy Technology, to better align efforts depending on the technology readiness level of the effort.

A. Mission Description and Budget Item Justification

This project provides for the demonstration and detailed assessment of space unique technologies needed for advanced optical and laser systems. Starting in FY 2010 this project will be combined with other projects to better integrate the directed energy efforts.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
MAJOR THRUST: Develop and demonstrate advanced, long-range optical technologies such as advanced beam control; beam acquisition, tracking, and pointing; adaptive optics; dual line-of-sight pointing; large lightweight optics; and optical coatings. This includes atmospheric compensation/beam control experiments using large aperture telescopes, for space situational awareness applications such as high-resolution satellite imaging, detection and characterization of small/dim space objects, and high accuracy space object tracking. Note: In FY 2010, this thrust has been moved to Project 4866, Laser and Imaging Technology, in PE 0602605F, Directed Energy Technology, to better reflect the technology readiness level of these efforts. In FY 2008: Continued design and began subsystem integration of high efficiency adaptive optics system for compensated imaging and detection of very dim space objects at visible and near infrared wavelengths. Performed laboratory tests to validate the performance of lightweight mirrors. In FY 2009: Integrate high efficiency adaptive optics system on large aperture high resolution telescope. Perform system tests and prepare for demonstrations of high resolution compensated imaging and detection of very dim space objects at visible and infrared wavelengths. Conclude phased array imaging experiments. In FY 2010: Not Applicable.	5.818	4.365	0.000	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009			
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology			PROJECT NUMBER 6311SP	
B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
MAJOR THRUST: Develop and demonstrate advanced optical beam control technologies for laser propagation through severe and/or extended atmospheric turbulence. Note: In FY 2010, this thrust has been moved to Project 3151, Lasers and Imaging Development and Integration, to better align efforts. In FY 2008: Continued design of advanced ground diagnostic system for characterization of laser propagation through stressing atmospheric turbulence. Performed laboratory characterization on components for sensing and wavefront control technologies. In FY 2009: Complete design of advanced ground diagnostic system to characterize laser propagation through atmospheric turbulence in a variety of atmospheric conditions. In FY 2010: Not Applicable.		15.349	12.165	0.000	
CONGRESSIONAL ADD: Space Situational Awareness. In FY 2008: Developed, integrated, and tested component and system level technologies to advance space situational awareness. Improved the performance of current collection, analysis, fusion, and dissemination capabilities such as implementing sodium guidestar atmospheric compensation to the Maui Space Surveillance System. Developed technologies for satellite modeling and assessment. Developed tools for analysis, modeling, and simulation. Developed and demonstrated resolved and non-resolved satellite imaging concepts. Developed and demonstrated passive and active imaging concepts. Developed and demonstrated space-object identification techniques. Developed image processing algorithms. In FY 2009: Not Applicable. In FY 2010: Not Applicable.		14.580	0.000	0.000	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009			
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology			PROJECT NUMBER 6311SP	
B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
CONGRESSIONAL ADD: Satellite Active Imaging National Testbed (formerly GEO Light Imaging National Testbed (GLINT)). In FY 2008: Developed end-to-end simulation code for the compensated Fourier telescopy method incorporating a new reconstruction code. Completed a lab demonstration of the compensated Fourier telescopy method simulating all relevant parameters. In FY 2009: Not Applicable. In FY 2010: Not Applicable.		2.332	0.000	0.000	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 6311SP

C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
PE 0602605F/ Directed Energy Technology	0.000	0.000							Continuing	Continuing
PE 0603444F/ Maui Space Surveillance System	0.000	0.000							Continuing	Continuing
PE 0601108F/ High Energy Laser Research Initiatives.	0.000	0.000							Continuing	Continuing
PE 0602890F/ High Energy Laser Research.	0.000	0.000							Continuing	Continuing
PE 0603924F/ High Energy Laser Advanced Technology Program.	0.000	0.000							Continuing	Continuing
PE 0602120A/ Sensors and Electronic Survivability.	0.000	0.000							Continuing	Continuing
PE 0602307A/ Advanced Weapons Technology.	0.000	0.000							Continuing	Continuing
PE 0602624A/ Weapons and Munitions Technology.	0.000	0.000							Continuing	Continuing
PE 0603004A/ Weapons and Munitions Advanced Technology.	0.000	0.000							Continuing	Continuing
PE 0602114N/ Power Projection Applied Research.	0.000	0.000							Continuing	Continuing
PE 0602702E/ Tactical Technology.	0.000	0.000							Continuing	Continuing
	0.000	0.000							Continuing	Continuing

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification			DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)			R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology		PROJECT NUMBER 6311SP
PE 0603175C/ Ballistic Missile Defense Technology.					
PE 0603883C/ Ballistic Missile Defense Boost Phase Segment	0.000	0.000		Continuing	Continuing
PE 0602651M/ Joint Non-Lethal Weapons Applied Research.	0.000	0.000		Continuing	Continuing
PE 0603651M/ Joint Non-Lethal Weapons Technology Development.	0.000	0.000		Continuing	Continuing
Activity Not Provided/ This project has been coordinated through the Reliance 21 process to harmonize efforts and eliminate	0.000	0.000		Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

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.

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology					PROJECT NUMBER 633150	
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 Cost**
633150: Advanced Optics Technology	11.275	10.970	0.000						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops advanced optical technologies for various strategic and tactical beam control applications.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
CONGRESSIONAL ADD: Applications of LIDAR to Vehicles with Analysis (ALVA). In FY 2008: ALVA consists of two efforts: Standoff Intelligence Designator (SID) and Hi-Class. SID: Completed testing of active nighttime imagers and prepared to transition technology to customers. Developed smaller, lighter laser imagers for new customers. Evaluated potential for using continuous-wave laser sensors for different applications. Hi-Class: Continued integration and began testing of the three-dimensional capability for imaging/detection of small/dim space objects. Continued efforts to integrate a hyperspectral imager into the Hi-Class system. In FY 2009: ALVA consists of two efforts: Standoff Intelligence Designator (SID) and Hi-Class. SID: Develop airborne night-time imaging for counter improvised explosive devices (IEDs) and operational intel and targeting users such as US Marine Corps, Air Combat Command, and US Special Operations Command. Support transition of militarily useful lasers for nighttime video, by flight testing, integration of state-of-the-art sensors into real-world air frames, proof of concept for communications networks, perform evaluation studies, and participate in war games and exercises. Hi-Class: Integrate laser ranging detector into active tracking system. Continue research and data collection for three dimensional imaging of space objects and ranging applications. In FY 2010: Not Applicable.	8.165	6.981	0.000	
CONGRESSIONAL ADD: Real-time Optical Surveillance Applications (ROSA).	1.555	2.792	0.000	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633150

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY 2008: Leveraged previously developed models to examine three dimensional imaging capabilities of time-resolved photon counter for improvements in pose estimation. Conducted modeling and simulation studies to push current capabilities in pose estimation and change detection with optical sensors. Pursued artificial intelligence concept in automation of telescope networks for space situational awareness mission. In FY 2009: Continue development of models to study potential of ultra sensitive time-resolved photon counter for covert active imaging. Continue modeling and simulation studies to push current capabilities in pose estimation and change detection with optical sensors. Explore artificial intelligence concept for responsive automation of telescope networks for space situational awareness mission. In FY 2010: Not Applicable.				
CONGRESSIONAL ADD: Compound Zoom for Airborne Reconnaissance (CZAR). In FY 2008: Developed requirements and preliminary designs for hardware and software modifications to adapt and demonstrate a commercial high quality compact compound zoom lens for an Air Force application. Conducted a study to evaluate multiple sensors (cameras). Used modeling and simulation to develop robust stabilization control. In FY 2009: Complete critical design review and fabricate optical system. Integrate optical system and conduct laboratory testing. Fabricate and integrate stabilization control system. Develop system software and system test plan. In FY 2010: Not Applicable.	1.555	1.197	0.000	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633150

C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
Activity Not Provided/ Related Activities:	0.000	0.000							Continuing	Continuing
PE 0603444F/ Maui Space Surveillance Systems.	0.000	0.000							Continuing	Continuing
PE 0602605F/ Directed Energy Technology.	0.000	0.000							Continuing	Continuing
Activity Not Provided/ This project has been coordinated through the Reliance 21 process to harmonize efforts and eliminate	0.000	0.000							Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

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.

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology					PROJECT NUMBER 633151	
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 Cost**
633151: Lasers and Imaging Development and Integration	19.166	20.513	16.624						Continuing	Continuing

Note

Note: In FY 2010, some of the efforts from Project 11SP, Advanced Optics and Laser Space Technology, are being moved to this Project to better align efforts. Also in FY 2010, some of the electric laser, relay mirror, and space situational awareness efforts in this project have been moved into PE 0602605F, Directed Energy Technology, to better reflect the technology readiness level of the efforts.

A. Mission Description and Budget Item Justification

This project provides for the development, integration, demonstration, and detailed assessment of imaging and laser and beam control technologies needed for aircraft self-protection, force protection, force application, precision engagement, space situational awareness, and Global War on Terrorism missions. Critical technologies developed and demonstrated include: (1) compact, reliable, and affordable laser devices with good beam quality and scalability to high power; (2) advanced optics, imaging, and laser beam control components to compensate and propagate laser radiation through the atmosphere and/or to detect and characterize space objects. Perform laser system concept assessments to include vulnerability assessments and target effect testing.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
MAJOR THRUST: Develop, integrate, and demonstrate electric, chemical, gas, and hybrid laser technologies for scalable, high energy laser devices for future insertion into airborne tactical and strategic applications and ground-based laser system concepts. In FY 2008: Continued development of electric lasers for a wide set of applications including tactical weapons, self-defense, and space situational awareness (e.g. active tracking and imaging) with a goal of exceeding the thresholds for system power, beam quality, and run time capabilities. These technologies will reduce laser size and weight, as well as increase efficiency, affordability, reliability, maintainability, supportability, operational environmental acceptability, and ruggedness. Completed development of a 15 kilowatt solid state laser to be coupled to an existing beam control subsystem for an integrated laboratory testbed.	5.002	5.973	2.726	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009			
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology			PROJECT NUMBER 633151	
B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
In FY 2009: Continue to develop electric lasers for a variety of applications such as aircraft self-protection. Continue to focus on reducing size and weight, as well as increasing efficiency, affordability, reliability, maintainability, supportability, operational environmental acceptability, and ruggedness. Complete integration of the 15 kilowatt solid state laser with an existing beam control subsystem for an integrated laboratory testbed. Prepare for integration of appropriate laser technologies for a large aircraft demonstration of electric laser-based precision engagements. In FY 2010: Design, develop, and test aircraft self-protection components including electric laser source and beam director capable of countering next generation missile threats with seekers based on imaging (focal plane array) technology. Develop appropriate technologies to allow the use of a solid state laser in a demonstration of a potential weapon system capability on a large aircraft.					
MAJOR THRUST: Develop, integrate, and demonstrate advanced optical and imaging technologies for advanced systems concepts. Develop and demonstrate integrated tactical laser and beam control technologies. Technologies include optical components, optical coatings, advanced beam control, atmospheric compensation, and pointing and tracking. Analyze system concepts and perform critical experiments with integrated laser and beam control technologies. Note: Funding was increased in FY 2009 for additional integrated demonstrations leading to an earlier transition of tactical airborne laser and beam control technologies. Based on the technology readiness level of the tactical relay mirror technology, in FY 2010 this effort was moved into PE 0602605F, Directed Energy Technology. In FY 2008: Demonstrated advanced tactical beam control hardware components in the laboratory. Analyzed advanced beam control concepts in integrated simulations. Began development of the second-generation tactical relay mirror demonstrator including the telescopes, the optics, the associated gimbals, the lightweight optics bench, and electronics. Conducted ground demonstrations of an integrated tactical laser on an aircraft. Working with DARPA, completed preliminary design and began component development to allow integration of their High Energy Liquid Laser Area Defense System (HELLADS) with a beam control system.		12.317	13.583	5.730	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633151

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
In FY 2009: Continue integrated tactical beam control field tests to enhance advanced active contour tracking algorithms and advanced jitter reduction in breadth of environments for airborne tactical laser engagements. Continue the development of the second-generation relay mirror demonstrator components. Prepare to demonstrate the use of the second-generation relay mirror components with solid state lasers in the laboratory. Conduct airborne flight demonstrations of a tactical laser against ground targets. With DARPA continue development and begin integration and checkout of beam control, and data analysis subsystems to allow integration of the HELLADS with a beam control system. In FY 2010: Conduct advanced tactical beam control demonstrations. With DARPA, complete major subsystem development, integration, and checkout; conduct low-power beam control field testing to validate target acquisition, tracking, and beam pointing performance to allow integration of the DARPA HELLADS with a beam control system. Complete systems integration and checkout, with the exception of integration with the HELLADS laser device.				
MAJOR THRUST: Develop, integrate, and demonstrate advanced technologies for various space applications including high resolution satellite imaging, object discrimination, small/dim object detection and characterization, laser propagation through atmospheric turbulence, and high accuracy space object tracking. Note: In FY 2010, this thrust was moved from project 11SP, Advanced Optics and Laser Space Technology, to better reflect the relationship with the other efforts in this project. In FY 2008: Not Applicable. In FY 2009: Not Applicable. In FY 2010: Build advanced ground diagnostic system for characterizing laser propagation through atmospheric turbulence. Begin to conduct assessment of system performance in a variety of atmospheric conditions. Conduct brassboard integration of advanced sensing and wavefront control technologies.	0.000	0.000	8.168	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633151

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
CONGRESSIONAL ADD: All Electric Laser. In FY 2008: Developed electric laser technologies for airborne applications. In FY 2009: Not Applicable. In FY 2010: Not Applicable.	1.847	0.000	0.000	
CONGRESSIONAL ADD: Advanced Fiber Lasers Systems and Components In FY 2008: Not Applicable. In FY 2009: Improve power scaling and efficiency of fiber laser components. Validate approach to eye safe technology, and demonstrate architectural improvements to meet emerging DoD and commercial applications. In FY 2010: Not Applicable.	0.000	0.957	0.000	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633151

C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
Activity Not Provided/ Related Activities:	0.000	0.000							Continuing	Continuing
PE 0602102F/ Materials.	0.000	0.000							Continuing	Continuing
PE 0603270F/ Electronic Combat Technology.	0.000	0.000							Continuing	Continuing
PE 0602605F/ Directed Energy Technology.	0.000	0.000							Continuing	Continuing
PE 0601108F/ High Energy Laser Research Initiatives.	0.000	0.000							Continuing	Continuing
PE 0602890F/ High Energy Laser Research.	0.000	0.000							Continuing	Continuing
PE 0603924F/ High Energy Laser Advanced Technology Program.	0.000	0.000							Continuing	Continuing
PE 0602120A/ Sensors and Electronic Survivability.	0.000	0.000							Continuing	Continuing
PE 0602307A/ Advanced Weapons Technology.	0.000	0.000							Continuing	Continuing
PE 0602624A/ Weapons and Munitions Technology.	0.000	0.000							Continuing	Continuing
PE 0603004A/ Weapons and Munitions Advanced Technology.	0.000	0.000							Continuing	Continuing
PE 0602114N/ Power Projection Applied Research.	0.000	0.000							Continuing	Continuing

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification				DATE: May 2009	
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)			R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633151	
PE 0603175C/ Ballistic Missile Defense Technology	0.000	0.000		Continuing	Continuing
PE 0603883C/ Ballistic Missile Defense Boost Phase Segment.	0.000	0.000		Continuing	Continuing
PE 0602651M/ Joint Non-Lethal Weapons Applied Research.	0.000	0.000		Continuing	Continuing
PE 0602651M/ Joint Non-Lethal Weapons Applied Research.	0.000	0.000		Continuing	Continuing
Activity Not Provided/ This project has been coordinated through the Reliance 21 process to harmonize efforts and eliminate	0.000	0.000		Continuing	Continuing
Activity Not Provided/The technology efforts in this PE that are supporting future enhancements to airborne lasers have be	0.000	0.000		Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

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.

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology					PROJECT NUMBER 633152	
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 Cost**
633152: High Power Microwave Development and Integration	10.036	8.270	13.432						Continuing	Continuing

A. Mission Description and Budget Item Justification

This project develops and demonstrates high power microwave (HPM) and other unconventional weapon generation and transmission technologies that support a wide range of Air Force missions such as the potential disruption, degradation, damage, or destruction of an adversary's electronic infrastructure and military capability. These targeted capabilities include local computer and communication systems, as well as large and small air defense and command and control systems. In many cases, this effect can be covert with no collateral structural or human damage. In addition, millimeter wave force protection technologies are developed and demonstrated. It also develops a susceptibility, vulnerability, and lethality data base to identify potential vulnerabilities of U.S. systems to HPM threats and to provide a basis for future offensive and defensive weapon system decisions. Representative U.S. and foreign assets are tested to understand real system susceptibilities. Both wideband (wide frequency range) and narrowband (very small frequency range) technologies are being developed.

B. Accomplishments/Planned Program ($ in Millions)	**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
MAJOR THRUST: Conduct effects experimentation to expand and refine data library and support susceptibility predictions. Investigate and develop technologies for HPM airfield defense. Note: Due to higher Air Force priorities this thrust is being terminated in FY 2009. In FY 2008: Refined airfield defense technologies. Evaluated components as appropriate. In FY 2009: Not Applicable. In FY 2010: Not Applicable.	2.237	0.000	0.000	
MAJOR THRUST: Develop and evaluate millimeter-wave Active Denial technologies for non-lethal, anti-personnel weapon applications such as ground force protection from a stand-off aircraft.	3.416	2.333	0.546	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009			
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology			PROJECT NUMBER 633152	
B. Accomplishments/Planned Program ($ in Millions)		**FY 2008**	**FY 2009**	**FY 2010**	**FY 2011**
In FY 2008: Continued to develop and evaluate technologies for Air Force non-lethal weapons applications. Finished initial manufacturer testing and started rebuild of the conventional millimeter-wave device approach for long-range/airborne applications. Continued with hardware development, procurement, fabrication, and testing for the full-power source test stand for long-range/airborne concepts. Provided technical expertise and background to external organizations tailoring Active Denial concepts and capabilities to their needs and gathered data relevant to airborne applications. In FY 2009: Continue to develop and evaluate technologies for Air Force non-lethal weapons applications. Complete development of first iteration full-power non-lethal test source for airborne/long range configurations. Continue hardware development, procurement, fabrication, and testing for the full power source test stand for airborne/long range configurations. Provide technical expertise and background to external organizations tailoring Active Denial concepts and capabilities to their needs and glean data relevant to airborne applications. In FY 2010: Continue to develop and evaluate technologies for Air Force non-lethal weapons applications. Continue hardware development, procurement, fabrication, and testing for the full-power source test stand for long-range/airborne configurations. Conduct engagement modeling and simulation supporting next generation system requirements refinement and associated flowdown to technical system requirements. Develop, analyze, and evaluate source and thermal subsystem options for next-generation non-lethal systems. Provide technical expertise and background to external organizations tailoring Active Denial concepts and capabilities to their needs and glean data relevant to airborne applications.					
MAJOR THRUST: Develop the technology to integrate HPM and other unconventional weapon devices on various platforms, to include aerial, and investigate specific target sets of interest. Develop and demonstrate HPM technologies to disrupt, degrade, damage, or destroy an adversary's electronic systems. Note: Increased funding in FY 2010 for the HPM counter-electronics Joint Capability Technology Demonstration. In FY 2008: Integrated and ruggedized the HPM counter-electronics testbed for field experimentation. Performed HPM system testing and diagnostics. Improved HPM testbed command and control systems for pulsed operation greater than threshold levels. Tested and developed HPM source technology for candidate		4.383	5.937	12.886	

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633152

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
HPM platforms. Evaluated HPM antenna air-breakdown mechanisms. Integrated and assured designed operation of advanced HPM power combining technology into HPM testbed system. Operated new system to determine the air breakdown threshold on newly developed HPM antenna. Implemented successful redesign of and performed acceptance testing of compact pulsed power component. Integrated newly developed HPM source with compact pulser and tested to assure designed operation. In FY 2009: Conduct laboratory demonstration of the miniaturized and ruggedized HPM counter-electronics testbed. Enhance the system performance and address all electromagnetic interference issues. Develop HPM components for aerial demonstrator system. Test HPM components for performance and ruggedization. Enhance the system performance and address electromagnetic interference issues. Develop command and control systems for the HPM aerial demonstrator. Implement enhancements to HPM source component technology for the aerial demonstration system. Use testbed to determine the air breakdown threshold on new HPM antenna. Perform testing on new HPM source. In FY 2010: Integrate narrowband HPM components into a demonstration HPM counter-electronics aerial platform. Conduct ground testing of the demonstrator HPM aerial system that includes effects testing and environmental testing of the integrated system. Obtain flight certification of the narrowband HPM aerial system. Conduct effects experiments using the narrowband HPM system which includes evaluating battle damage assessment capability. Refine and implement HPM source component technology to overcome unforeseen issues in application systems. Fabricate next-generation compact HPM components for candidate aerial platforms, implement in testbeds, and test operation and performance.				

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633152

C. Other Program Funding Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
Activity Not Provided/ Related Activities:	0.000	0.000							Continuing	Continuing
PE 0602202F/ Human Systems Technology.	0.000	0.000							Continuing	Continuing
PE 0602605F/ Directed Energy Technology.	0.000	0.000							Continuing	Continuing
PE 0602120A/ Sensors and Electronic Survivability.	0.000	0.000							Continuing	Continuing
PE 0602624A/ Weapons and Munitions Technology.	0.000	0.000							Continuing	Continuing
PE 0602114N/ Power Projection.	0.000	0.000							Continuing	Continuing
PE 0602651M/ Joint Non-Lethal Weapons Applied Research.	0.000	0.000							Continuing	Continuing
PE 0603851M/ Nonlethal Weapons.	0.000	0.000							Continuing	Continuing
Activity Not Provided/ This project has been coordinated through the Reliance 21 process to harmonize efforts and eliminate	0.000	0.000							Continuing	Continuing

D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification		DATE: May 2009
APPROPRIATION/BUDGET ACTIVITY 3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD)	R-1 ITEM NOMENCLATURE PE 0603605F Advanced Weapons Technology	PROJECT NUMBER 633152

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.

THIS PAGE INTENTIONALLY LEFT BLANK