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| Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force | | | | | | | | | DATE: February 2010 | | |
| 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 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 | 61.420 | 44.794 | 17.461 | 0.000 | 17.461 | 28.683 | 32.749 | 34.542 | 35.944 | Continuing | Continuing |
| 6311SP: Advanced Optics and Laser Space Tech | 15.477 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| 633150: Advanced Optics Technology | 10.970 | 9.460 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| 633151: Lasers and Imaging Development and Integration | 26.467 | 21.965 | 6.883 | 0.000 | 6.883 | 16.487 | 21.563 | 22.887 | 23.452 | Continuing | Continuing |
| 633152: High Power Microwave Development and Integration | 8.506 | 13.369 | 10.578 | 0.000 | 10.578 | 12.196 | 11.186 | 11.655 | 12.492 | 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. | | | | | | | | | | | |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force | | | | DATE: February 2010 | |
| APPROPRIATION/BUDGET ACTIVITY | | R-1 ITEM NOMENCLATURE | | | |
| 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD) | | PE 0603605F: Advanced Weapons Technology | | | |
| B. Program Change Summary (\$ in Millions) | | | | | |
| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| Previous President's Budget | 56.283 | 30.056 | 0.000 | 0.000 | 0.000 |
| Current President's Budget | 61.420 | 44.794 | 17.461 | 0.000 | 17.461 |
| Total Adjustments | 5.137 | 14.738 | 17.461 | 0.000 | 17.461 |
| • Congressional General Reductions | | -0.015 | | | |
| • Congressional Directed Reductions | | 0.000 | | | |
| • Congressional Rescissions | 0.000 | -0.187 | | | |
| • Congressional Adds | | 14.940 | | | |
| • Congressional Directed Transfers | | 0.000 | | | |
| • Reprogrammings | 0.000 | 0.000 | | | |
| • SBIR/STTR Transfer | 0.000 | 0.000 | | | |
| • Other Adjustments | 5.137 | 0.000 | 17.461 | 0.000 | 17.461 |
| Congressional Add Details (\$ in Millions, and Includes General Reductions) | | | | | |
| Project: 633150: Advanced Optics Technology | | | | FY 2009 | FY 2010 |
| Congressional Add: Compound Zoom for Airborne Reconnaissance (CZAR). | | | | 1.197 | 0.000 |
| Congressional Add: Applications of LIDAR to Vehicles with Analysis (ALVA). | | | | 6.981 | 5.975 |
| Congressional Add: Real-time Optical Surveillance Applications (ROSA). | | | | 2.792 | 3.485 |
| Congressional Add Subtotals for Project: 633150 | | | | 10.970 | 9.460 |
| Project: 633151: Lasers and Imaging Development and Integration | | | | | |
| Congressional Add: Advanced Tactical Laser. | | | | 0.000 | 2.231 |
| Congressional Add: Advanced Fiber Lasers Systems and Components. | | | | 0.957 | 3.187 |
| Congressional Add Subtotals for Project: 633151 | | | | 0.957 | 5.418 |
| Congressional Add Totals for all Projects | | | | 11.927 | 14.878 |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force | | DATE: February 2010 |
| 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 | |
| <p><u>Change Summary Explanation</u></p> <p>The FY 2010 President's Budget submittal did not reflect FY 2011 through FY 2015 funding. A detailed explanation of changes between the two budget positions is not provided because it cannot be made in a relevant manner.</p> <p>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.</p> <p>Note: In FY 2010, Congress added \$3.2 million for Advanced Fiber Lasers Systems and Components, \$6.0 million for Applications of LIDAR to Vehicles with Analysis, \$3.5 million for Real-time Optical Surveillance Applications, and \$2.24 million for Advanced Tactical Laser.</p> <p>C. Performance Metrics Under Development.</p> | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | | DATE: February 2010 | | |
| 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 6311SP: Advanced Optics and Laser Space Tech | | | |
| 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 |
| 6311SP: Advanced Optics and Laser Space Tech | 15.477 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 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 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| MAJOR THRUST: Develop and demonstrate optical technologies for space situational awareness applications. FY 2009 Accomplishments: In FY 2009: Integrated high efficiency adaptive optics system on large aperture high resolution telescope. Performed system tests and prepared for demonstrations of high resolution compensated imaging and detection of very dim space objects at visible and infrared wavelengths. Concluded phased array imaging experiments. FY 2010 Plans: In FY 2010: Not Applicable. FY 2011 Base Plans: In FY 2011: Not Applicable. | | | | | | | 4.365 | 0.000 | 0.000 | 0.000 | 0.000 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | | DATE: February 2010 | | |
| 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 6311SP: Advanced Optics and Laser Space Tech | | | | |
| B. Accomplishments/Planned Program (\$ in Millions) | | | | | | | | | | | |
| | | | | | | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total | |
| FY 2011 OCO Plans: In FY 2011 OCO: N/A | | | | | | | | | | | |
| MAJOR THRUST: Develop and demonstrate advanced optical beam control technologies for laser propagation through severe and/or extended atmospheric turbulence. FY 2009 Accomplishments: In FY 2009: Completed design of advanced ground diagnostic system to characterize laser propagation through atmospheric turbulence in a variety of atmospheric conditions. In FY 2010, this thrust has been moved to Project 3151, Lasers and Imaging Development and Integration, to better align efforts. FY 2010 Plans: In FY 2010: Not Applicable. FY 2011 Base Plans: In FY 2011: Not Applicable. FY 2011 OCO Plans: In FY 2011 OCO: N/A | | | | | | 11.112 | 0.000 | 0.000 | 0.000 | 0.000 | |
| Accomplishments/Planned Programs Subtotals | | | | | | 15.477 | 0.000 | 0.000 | 0.000 | 0.000 | |
| C. Other Program Funding Summary (\$ in Millions) | | | | | | | | | | | |
| Line Item | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total | FY 2012 | FY 2013 | FY 2014 | FY 2015 | Cost To Complete | Total Cost |
| • PE 0602605F: Directed Energy Technology | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | | DATE: February 2010 | | |
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| APPROPRIATION/BUDGET ACTIVITY | | | | R-1 ITEM NOMENCLATURE | | | | PROJECT | | | |
| 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD) | | | | PE 0603605F: Advanced Weapons Technology | | | | 6311SP: Advanced Optics and Laser Space Tech | | | |
| C. Other Program Funding Summary (\$ in Millions) | | | | | | | | | | | |
| Line Item | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total | FY 2012 | FY 2013 | FY 2014 | FY 2015 | Cost To Complete | Total Cost |
| • PE 0603444F: Maui Space Surveillance System | | | | | | | | | | | |
| • PE 0601108F: High Energy Laser Research Initiatives. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602890F: High Energy Laser Research. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603924F: High Energy Laser Advanced Technology Program. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602120A: Sensors and Electronic Survivability. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602307A: Advanced Weapons Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602624A: Weapons and Munitions Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603004A: Weapons and Munitions Advanced Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602114N: Power Projection Applied Research. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602702E: Tactical Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603175C: Ballistic Missile Defense Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603883C: Ballistic Missile Defense Boost Phase Segment | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602651M: Joint Non-Lethal Weapons Applied Research. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | | | DATE: February 2010 | |
| APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i> | | | | R-1 ITEM NOMENCLATURE PE 0603605F: <i>Advanced Weapons Technology</i> | | | | PROJECT 6311SP: <i>Advanced Optics and Laser Space Tech</i> | | | |
| 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> |
| <ul style="list-style-type: none"> • PE 0603651M: <i>Joint Non-Lethal Weapons Technology Development.</i> | | | | | | | | | | | |
| 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. | | | | | | | | | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | DATE: February 2010 | | | |
| APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i> | | | | R-1 ITEM NOMENCLATURE PE 0603605F: <i>Advanced Weapons Technology</i> | | | | PROJECT 633150: <i>Advanced Optics Technology</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 |
| 633150: <i>Advanced Optics Technology</i> | 10.970 | 9.460 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | Continuing | Continuing |
| Note Note: Funding in this project is due to Congressional adds. | | | | | | | | | | | |
| 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 2009 | FY 2010 | | | |
| Congressional Add: Compound Zoom for Airborne Reconnaissance (CZAR). <i>FY 2009 Accomplishments:</i> In FY 2009: Completed critical design review of optical system. Continued integrating optical system and conduct preparation for laboratory testing. Began to develop system software and system test plan. <i>FY 2010 Plans:</i> In FY 2010: Not Applicable. | | | | | | | 1.197 | 0.000 | | | |
| Congressional Add: Applications of LIDAR to Vehicles with Analysis (ALVA). <i>FY 2009 Accomplishments:</i> In FY 2009: ALVA consists of two efforts: Standoff Intelligence Designator (SID) and Hi-Class. SID: Continued development of airborne night-time imaging for counter improvised explosive devices | | | | | | | 6.981 | 5.975 | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | DATE: February 2010 | | | |
| 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 633150: Advanced Optics Technology | | | | | |
| B. Accomplishments/Planned Program (\$ in Millions) | | | | | | | | | | | |
| | | | | | | FY 2009 | FY 2010 | | | | |
| (IEDs) and operational intel and targeting users such as Air Combat Command, and U.S. Special Operations Command. Supported transition of militarily useful lasers for nighttime video through deployment and flight testing. Integrated state-of-the-art sensors into real-world air frames and communications networks. Participated in war games and exercises. Hi-Class: Tested laser ranging detector with active tracking system. Continued research and data collection for three dimensional imaging of space objects and ranging applications. Developed capability to reliably conduct laser operations during the day. FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for ALVA. | | | | | | | | | | | |
| Congressional Add: Real-time Optical Surveillance Applications (ROSA). FY 2009 Accomplishments: In FY 2009: Developed model-assisted autonomous algorithms for satellite location and orientation. Continued simulation-based studies of various means to exploit data from ultra-sensitive time-resolved photon counter for space situational awareness capabilities. Continued development of high-fidelity end-to-end simulation environment of autonomous networked electro-optical sensors for research in resource management schemes in support of space track and catalog mission. FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for ROSA. | | | | | | 2.792 | 3.485 | | | | |
| Congressional Adds Subtotals | | | | | | 10.970 | 9.460 | | | | |
| C. Other Program Funding Summary (\$ in Millions) | | | | | | | | | | | |
| Line Item | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total | FY 2012 | FY 2013 | FY 2014 | FY 2015 | Cost To Complete | Total Cost |
| • PE 0603444F: Maui Space Surveillance Systems. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | DATE: February 2010 | | | |
| APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i> | | | | R-1 ITEM NOMENCLATURE PE 0603605F: <i>Advanced Weapons Technology</i> | | | | PROJECT 633150: <i>Advanced Optics Technology</i> | | | |
| <u>C. Other Program Funding Summary (\$ in Millions)</u> | | | | | | | | | | | |
| <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 0602605F: <i>Directed Energy Technology.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| <u>D. Acquisition Strategy</u> Not Applicable. | | | | | | | | | | | |
| <u>E. Performance Metrics</u> 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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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | DATE: February 2010 | | | |
| APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i> | | | | R-1 ITEM NOMENCLATURE PE 0603605F: <i>Advanced Weapons Technology</i> | | | | PROJECT 633151: <i>Lasers and Imaging Development and Integration</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 |
| 633151: <i>Lasers and Imaging Development and Integration</i> | 26.467 | 21.965 | 6.883 | 0.000 | 6.883 | 16.487 | 21.563 | 22.887 | 23.452 | 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 optical imaging, laser, and beam control technologies needed for applications such as aircraft self-protection, force protection, force application, precision engagement, and space situational awareness. 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 optically 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 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| MAJOR THRUST: Develop and demonstrate laser technologies for applications such as aircraft self-protection. | 5.729 | 2.223 | 2.693 | 0.000 | 2.693 |
| FY 2009 Accomplishments: In FY 2009: Continued to develop electric lasers for aircraft self-protection. Continued to focus on reducing size and weight, as well as increasing efficiency, affordability, reliability, maintainability, supportability, operational environmental acceptability, and ruggedness. Completed integration of a 15 kilowatt solid state laser with an existing beam control subsystem for an integrated laboratory testbed to support multiple applications. | | | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | DATE: February 2010 | | |
| 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 633151: Lasers and Imaging Development and Integration | | | |
| B. Accomplishments/Planned Program (\$ in Millions) | | | | | |
| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| FY 2010 Plans: 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. FY 2011 Base Plans: In FY 2011: Develop integrated breadboard aircraft self-protection focal plane array damage system compatible with mid-wave infrared detection and jamming capabilities. Validate aircraft self-protection fly-out model codes with effects/lethality data. FY 2011 OCO Plans: In FY 2011 OCO: N/A | | | | | |
| MAJOR THRUST: Develop and demonstrate advanced beam control technologies and evaluate integrated tactical lasers with beam control. FY 2009 Accomplishments: In FY 2009: Continued integrated tactical beam control field tests to enhance advanced active contour tracking algorithms and advanced jitter reduction in breadth of environments. Continued developing the second-generation relay mirror demonstrator components. Completed preparations to demonstrate second-generation relay mirror components with solid state lasers in the laboratory. Conducted airborne flight demonstrations of a tactical laser against ground targets. With DARPA, continued development and began integration and checkout of beam control, and data analysis subsystems to allow integration of the solid state laser with a beam control system for ground demonstrations. Continued to prepare for integration of appropriate laser technologies for a future large aircraft demonstration of electric laser-based precision engagements. | 19.781 | 6.192 | 4.190 | 0.000 | 4.190 |
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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | DATE: February 2010 | | |
| 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 633151: Lasers and Imaging Development and Integration | | |
| B. Accomplishments/Planned Program (\$ in Millions) | | | | | | |
| | | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| FY 2010 Plans: In FY 2010: Conduct advanced tactical beam control demonstrations. With DARPA, complete major subsystem development, integration, and checkout and conduct low-power beam control field testing to validate target acquisition, tracking, and beam pointing performance to allow integration of the DARPA solid state laser with a beam control system. Complete systems integration and checkout, with the exception of integration with the laser device. 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. | | | | | | |
| FY 2011 Base Plans: In FY 2011: Continue advanced tactical beam control development and demonstrations. With DARPA, integrate the solid state laser device with the appropriate beam control subsystems and complete checkout and subsystem performance testing in preparation for the FY 2012 ground demonstrations. Continue technology development for future integration of a high power solid state laser and a beam control system on a large aircraft. | | | | | | |
| FY 2011 OCO Plans: In FY 2011 OCO: N/A | | | | | | |
| MAJOR THRUST: Develop, integrate, and demonstrate advanced technologies for various ground-based space situational awareness applications. FY 2009 Accomplishments: In FY 2009: Not Applicable. FY 2010 Plans: 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. Based on changes in space acquisition, the remaining efforts in this thrust were moved | | 0.000 | 8.132 | 0.000 | 0.000 | 0.000 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | DATE: February 2010 | | |
| 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 633151: Lasers and Imaging Development and Integration | | |
| B. Accomplishments/Planned Program (\$ in Millions) | | | | | | |
| | | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| to PE 0602605F, Directed Energy Technology in order to better match available technology with transition opportunities in the future. FY 2011 Base Plans: In FY 2011: Not Applicable. FY 2011 OCO Plans: In FY 2011 OCO: N/A | | | | | | |
| Accomplishments/Planned Programs Subtotals | | 25.510 | 16.547 | 6.883 | 0.000 | 6.883 |
| | | FY 2009 | FY 2010 | | | |
| Congressional Add: Advanced Tactical Laser. FY 2009 Accomplishments: In FY 2009: Not Applicable. FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for Advanced Tactical Laser. | | 0.000 | 2.231 | | | |
| Congressional Add: Advanced Fiber Lasers Systems and Components. FY 2009 Accomplishments: In FY 2009: Improved power scaling and efficiency of fiber laser components. Demonstrated architectural improvements to meet emerging DoD and commercial applications. | | 0.957 | 3.187 | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | | DATE: February 2010 | | |
| 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 633151: Lasers and Imaging Development and Integration | | | | | |
| B. Accomplishments/Planned Program (\$ in Millions) | | | | | | | | | | | |
| | | | | | | FY 2009 | FY 2010 | | | | |
| FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for Advanced Fiber Lasers Systems and Components. | | | | | | | | | | | |
| Congressional Adds Subtotals | | | | | | 0.957 | 5.418 | | | | |
| C. Other Program Funding Summary (\$ in Millions) | | | | | | | | | | | |
| Line Item | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total | FY 2012 | FY 2013 | FY 2014 | FY 2015 | Cost To Complete | Total Cost |
| • PE 0602102F: Materials. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603270F: Electronic Combat Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602605F: Directed Energy Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0601108F: High Energy Laser Research Initiatives. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602890F: High Energy Laser Research. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603924F: High Energy Laser Advanced Technology Program. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602120A: Sensors and Electronic Survivability. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602307A: Advanced Weapons Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602624A: Weapons and Munitions Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603004A: Weapons and Munitions Advanced Technology. | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | | | DATE: February 2010 | |
| APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i> | | | | R-1 ITEM NOMENCLATURE PE 0603605F: <i>Advanced Weapons Technology</i> | | | | PROJECT 633151: <i>Lasers and Imaging Development and Integration</i> | | | |
| C. Other Program Funding Summary (\$ in Millions) | | | | | | | | | | | |
| Line Item | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total | FY 2012 | FY 2013 | FY 2014 | FY 2015 | Cost To Complete | Total Cost |
| • PE 0602114N: <i>Power Projection Applied Research.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603175C: <i>Ballistic Missile Defense Technology</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603883C: <i>Ballistic Missile Defense Boost Phase Segment.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602651M-A: <i>Joint Non-Lethal Weapons Applied Research.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602651M-B: <i>Joint Non-Lethal Weapons Applied Research.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 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. | | | | | | | | | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | DATE: February 2010 | | | |
| APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i> | | | | R-1 ITEM NOMENCLATURE PE 0603605F: <i>Advanced Weapons Technology</i> | | | | PROJECT 633152: <i>High Power Microwave Development and Integration</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 |
| 633152: <i>High Power Microwave Development and Integration</i> | 8.506 | 13.369 | 10.578 | 0.000 | 10.578 | 12.196 | 11.186 | 11.655 | 12.492 | Continuing | Continuing |
| <u>A. Mission Description and Budget Item Justification</u> 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. | | | | | | | | | | | |
| <u>B. Accomplishments/Planned Program (\$ in Millions)</u> | | | | | | | | | | | |
| | | | | | | | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| 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. <i>FY 2009 Accomplishments:</i> In FY 2009: Continued to develop and evaluate technologies for Air Force non-lethal weapons applications. Continued development of first iteration full-power non-lethal test source for airborne/long range configurations. Continued hardware development, procurement, fabrication, and testing for the full power source test stand for airborne/long range configurations. Provided technical expertise and background to external organizations tailoring Active Denial concepts and capabilities to their needs and glean data relevant to airborne applications. | | | | | | | 2.369 | 0.542 | 0.652 | 0.000 | 0.652 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | DATE: February 2010 | | |
| 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 633152: High Power Microwave Development and Integration | | | |
| B. Accomplishments/Planned Program (\$ in Millions) | | | | | |
| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| FY 2010 Plans: In FY 2010: Continue to develop and evaluate technologies for Air Force non-lethal weapons applications. 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. | | | | | |
| FY 2011 Base Plans: In FY 2011: Continue to develop and evaluate technologies for Air Force non-lethal weapons applications. Conduct additional engagement simulations supporting next generation system refinement. Begin prime power hardware development for next generation transmitters. Provide technical expertise and background to external organizations tailoring Active Denial concepts and capabilities to their needs and glean data relevant to airborne applications. | | | | | |
| FY 2011 OCO Plans: In FY 2011 OCO: N/A | | | | | |
| MAJOR THRUST: Develop and evaluate HPM and other unconventional weapon technologies including integration on various platforms, including aerial. Investigate specific target sets of interest. | 6.137 | 12.827 | 9.926 | 0.000 | 9.926 |
| FY 2009 Accomplishments: In FY 2009: Conducted laboratory demonstration of the miniaturized and ruggedized HPM counter-electronics system. Increased the system performance and addressed electromagnetic interference issues. Enhanced HPM components for aerial demonstrator system to increase system performance and ruggedization. Enhanced command and control systems for the HPM aerial demonstrator. Used testbed to determine the air breakdown threshold on new HPM antenna. Performed testing on new HPM source for next generation system. | | | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | DATE: February 2010 | | |
| 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 633152: High Power Microwave Development and Integration | | |
| B. Accomplishments/Planned Program (\$ in Millions) | | | | | | |
| | | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
| FY 2010 Plans: In FY 2010: As a part of CHAMP, integrate narrowband HPM components into a aerial platform for counter-electronics demonstrations. Conduct ground testing of CHAMP including effects testing and environmental testing of the integrated system. Obtain flight certification of the CHAMP system. Conduct effects experiments using the CHAMP hardware including 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. Increased funding in FY 2010 for the Counter-electronics HPM Advance Missile Project (CHAMP) Joint Capability Technology Demonstration. | | | | | | |
| FY 2011 Base Plans: In FY 2011: Complete the integration of narrowband HPM components into the CHAMP aerial platform. Continue ground testing of the CHAMP HPM system including effects testing and characterization of the performance. Conduct an inert flight test with the aerial platform to verify the guidance system accuracy, platform controllability for beam pointing, and timing for triggering of the HPM payload. Increased funding in FY 2011 for the CHAMP Joint Capability Technology Demonstration. | | | | | | |
| FY 2011 OCO Plans: In FY 2011 OCO: N/A | | | | | | |
| Accomplishments/Planned Programs Subtotals | | 8.506 | 13.369 | 10.578 | 0.000 | 10.578 |
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| Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force | | | | | | | | | | DATE: February 2010 | |
| APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i> | | | | R-1 ITEM NOMENCLATURE PE 0603605F: <i>Advanced Weapons Technology</i> | | | | PROJECT 633152: <i>High Power Microwave Development and Integration</i> | | | |
| C. Other Program Funding Summary (\$ in Millions) | | | | | | | | | | | |
| Line Item | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total | FY 2012 | FY 2013 | FY 2014 | FY 2015 | Cost To Complete | Total Cost |
| • PE 0602202F: <i>Human Systems Technology.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602605F: <i>Directed Energy Technology.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602120A: <i>Sensors and Electronic Survivability.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602624A: <i>Weapons and Munitions Technology.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602114N: <i>Power Projection.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0602651M-C: <i>Joint Non-Lethal Weapons Applied Research.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| • PE 0603851M: <i>Nonlethal Weapons.</i> | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| 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. | | | | | | | | | | | |

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