| Exhibit R-2, PB 2010 Air Force RDT&E Budget Item Justification | | | | | | | | | DATE: May 2009 | |
|---|---|---|---|---|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | | | | | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | | | |
| **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 | 60.877 | 65.115 | 51.482 | | | | | | Continuing | Continuing |
| 63665A: Advanced Aerospace Sensors Technology | 17.313 | 20.080 | 27.329 | | | | | | Continuing | Continuing |
| 6369DF: Target Attack and Recognition Technology | 31.317 | 34.823 | 24.153 | | | | | | Continuing | Continuing |
| 6388SP: Advanced Space Sensors | 12.247 | 10.212 | 0.000 | | | | | | Continuing | Continuing |

**Note**

Note: Funds for the FY 2008 Congressionally-directed Moving Target Strike in the amount of $1.6 million are in the process of being moved from PE 0603203F, Advanced Aerospace Sensors, to PE 0603601F, Conventional Weapons Technology, for execution.

**A. Mission Description and Budget Item Justification**

Divided into three broad project areas, this program develops technologies to enable the continued superiority of sensors from aerospace platforms. The first project develops and demonstrates advanced technologies for electro-optical sensors, radar sensors and electronic counter-countermeasures, and components and algorithms. The second project develops and demonstrates radio frequency and electro-optical sensors for detecting, locating, and targeting airborne, fixed, and time-critical mobile ground targets obscured by natural or man-made means. The third project develops and demonstrates space sensor technologies including radio-frequency sensors; intelligence, surveillance, and reconnaissance sensors; electro-optical sensors; laser warning sensors; targeting and attack radar sensors; and electronic counter-countermeasures and communications. Together, the projects in this program develop the means to find, fix, target, track, and engage air and ground targets anytime, anywhere, and in any weather. This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing system upgrades and/or new sensor and electronic combat 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**<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | **R-1 ITEM NOMENCLATURE**<br>PE 0603203F Advanced Aerospace Sensors |

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

| | FY 2008 | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|---|
| Previous President's Budget | 62.332 | 56.916 | 58.664 | |
| Current BES/President's Budget | 60.877 | 65.115 | 51.482 | |
| Total Adjustments | -1.455 | 8.199 | 0.000 | |
| Congressional Program Reductions | 0.000 | 1.177 | | |
| Congressional Rescissions | 0.000 | -0.178 | | |
| Total Congressional Increases | 0.000 | 7.200 | | |
| Total Reprogrammings | 0.000 | 0.000 | | |
| SBIR/STTR Transfer | -1.455 | 0.000 | | |

**Change Summary Explanation**

Note: In FY 2009, Congress added +$2.0M for Unmanned Air Vehicle Phenomenology and Automatic Target Recognition Tech Transition, +$1.6M for Automated Sensor-Communication Response Technology, +$2.0M for Moving Target Strike, +$1.6M for Precision Image Tracking and Registration, and +$1.2M for Reconfigurable Secure Computing Technologies.

C. Performance Metrics

Under Development.

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | | | | | | | DATE: May 2009 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | | | | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | | | PROJECT NUMBER<br>63665A | |
| **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** |
| 63665A: Advanced Aerospace Sensors Technology | 17.313 | 20.080 | 27.329 | | | | | | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This project develops and demonstrates aerospace sensor and processing technologies for intelligence, surveillance, reconnaissance, target, and attack radar applications in both manned and unmanned platforms, including electro-optical sensors and electronic counter-countermeasures for radars. It provides aerospace platforms with the capability to precisely detect, track, and target both airborne (conventional and low radar cross-section) and ground-based, high-value, time-critical targets in adverse clutter and jamming environments. Project activities include developing multi-function radio-frequency systems including radar and electronic warfare technology. Desired warfighting capabilities include the ability to detect concealed targets in difficult background conditions.

| B. Accomplishments/Planned Program ($ in Millions) | FY 2008 | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|---|
| MAJOR THRUST: Develop integrated electro-optical sensor technologies to search, detect, locate, and identify air and ground targets at ranges significantly longer than currently achievable, including targets that are camouflaged, low-observable, or employ other means of deception. Note: Funding peaks in FY 2008 due to the final increment of funding to develop the three-dimensional laser detection and ranging system supporting automated/assisted target recognition of obscured and urban targets, and the start of the system engineering and integration phase of that effort.<br><br>In FY 2008: Began airborne experiments demonstrating multi-function active/passive electro-optical/infrared demonstration system to detect, locate, and identify difficult targets in both obscured and urban environments for intelligence, surveillance, and reconnaissance applications. Performed fabrication and testing of high-resolution, three-dimensional laser radar for high confidence target identification coupled with passive spectral imaging for low false alarm rate detection utilizing advanced change detection and spatial-spectral discrimination techniques. Performed concept demonstration of multispectral/polarimetric focal plane array device for enhanced low contrast target discrimination. Completed fabrication of improved three-dimensional laser detection and ranging system and conducted testing of the engineering model. | 6.502 | 4.259 | 4.002 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>63665A | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2009: Continue airborne experiments with a multi-function active/passive electro-optical/infrared demonstration system to detect, locate, and identify difficult targets in both obscured and urban environments for intelligence, surveillance, and reconnaissance applications. Characterize end-to-end performance of high-resolution, three-dimensional laser radar for high confidence target identification coupled with passive spectral imaging for low false alarm rate detection utilizing advanced change detection and spatial-spectral discrimination techniques. Complete development of multispectral/polarimetric focal plane array device for enhanced low contrast target discrimination, and design airborne sensor module for enhancement of multi-function demonstration system.<br><br>In FY 2010: Complete end-to-end performance characterization, via airborne flight test, of high-resolution, three-dimensional laser radar for high confidence target identification coupled with passive spectral imaging for low false alarm rate detection utilizing change detection and spatial-spectral discrimination techniques. Continue design of airborne multispectral/polarimetric sensor module for long range target discrimination and integrated laser radar for long range identification of stationary and moving targets. | | | | | |
| MAJOR THRUST: Develop technologies to maximize positional accuracy, timing accuracy, and exploitation techniques to improve offensive and defensive combat capabilities.<br><br>In FY 2008: Developed worldwide ultra-accurate positioning system technologies to optimize time sensitive targeting, battlespace awareness, persistent intelligence, surveillance, and reconnaissance capabilities. Continued to develop multi-sensor phenomenology-based georegistration for imagery and perform lab tests of multi-intelligence georegistration.<br><br>In FY 2009: Demonstrate worldwide ultra-accurate positioning system technologies to optimize time sensitive targeting, battlespace awareness, persistent intelligence, surveillance, and reconnaissance capabilities. Continue to develop multi-sensor phenomenology-based georegistration for imagery and perform lab tests of multi-intelligence georegistration. | | 2.217 | 1.819 | 0.704 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>63665A | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2010: Demonstrate optimized reference for precise emitter geolocation, utilizing advanced two-way time transfer techniques. Explore feasibility and goals for reference optimization for bi-static and multi-static radar application. | | | | | |
| MAJOR THRUST: Develop, test, evaluate, and demonstrate lightweight, low power, compact radio-frequency sensors to detect, track, and target high-value, time-critical targets that are difficult to detect through either stealth or concealment and enable persistent intelligence, surveillance, and reconnaissance from an unmanned aerial vehicle. Develop and validate long-range intelligence, surveillance, and reconnaissance sensor technologies and techniques for the detection and track of advanced air and ground targets. Advanced target characteristics include targets with low radar cross section, concealment capabilities, or electronic counter-countermeasures. Note: The growing emphasis in this thrust in FY 2010 is due to an increased focus on multi-intelligence radio-frequency systems.<br><br>In FY 2008: Continued demonstration of the radio-frequency sensors of an integrated electro-optical/radio-frequency sensor suite (for unmanned aerial vehicles with severe size, weight, and power constraints) to enable single platform persistent intelligence, surveillance, and reconnaissance capabilities compatible with a system of systems architecture. Continued experiments with the modeling, simulation, and analysis test bed providing input into the required operation and controls for an airborne multi-intelligence experiment. Continued radar systems engineering support fostering the transition of developed enabling technologies and concepts to weapon systems and intelligence, surveillance, and reconnaissance assets. Initiated radar system analysis for improved air and ground target detection and tracking using cross-cued, dual-band radar.<br><br>In FY 2009: Continue demonstration of the radio-frequency sensors of an integrated electro-optical/radio-frequency sensor suite for unmanned aerial vehicles with severe size, weight, and power constraints to enable single platform persistent intelligence, surveillance, and reconnaissance capabilities compatible with a system of systems architecture. Continue systems analysis for improved air and ground target detection and tracking using cross-cued, dual-band radar coupled with electronic support sensors. Enhance the modeling, simulation, and analysis test bed with the inclusion of electro-optical sensing modes, and provide input into the required design for an integrated electro-optical/radio-frequency sensor suite, including required data processing and | | 4.589 | 9.507 | 17.868 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>63665A | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| exploitation. Continue sensor systems engineering support fostering the transition of developed enabling technologies and concepts to weapon systems and intelligence, surveillance, and reconnaissance assets. Continue experiments with the modeling, simulation, and analysis test bed providing input into a design for an airborne multi-intelligence experiment.<br><br>In FY 2010: Continue demonstration of the radio-frequency sensors (Ultra-High Frequency (UHF) radar, X-band radar, electronic support sensors) of an integrated electro-optical/radio-frequency sensor suite for unmanned aerial vehicles with severe size, weight, and power constraints to enable persistent intelligence, surveillance, and reconnaissance capabilities compatible with a system of systems architecture. Utilize the modeling, simulation, and analysis test bed, including radio-frequency and electro-optical sensing modes, to provide input into the required design for an integrated electro-optical/radio-frequency sensor suite, including required data processing and exploitation. Continue sensor systems engineering support fostering the transition of developed enabling technologies and concepts to weapon systems and intelligence, surveillance, and reconnaissance assets. Enhance the systems engineering to consider the optimal use of a high-altitude, long-endurance sensor platform within a layered sensing architecture. Initiate effort using multi-intelligence sensor suite to improve detection and tracking of difficult targets such as dismounts or targets in urban areas. Initiate efforts to improve the capabilities of passive sensing to enhance the detection and tracking of airborne and ground based targets with low radar cross section (including dismounts), concealment capabilities, or employment of electronic counter-countermeasures. | | | | | |
| MAJOR THRUST: Develop weapons guidance-quality track radar performance in advanced jamming environments. Develop and demonstrate advanced radar signal processing techniques to mitigate clutter and jamming interference and improve detection and tracking of difficult targets in hostile environments. NOTE: Effort ends in FY 2009.<br><br>In FY 2008: Demonstrated and evaluated multi-sensor waveform transmission and signal processing techniques on selected advanced computing architectures. Implemented novel space-time adaptive processing techniques that are robust to heterogeneous data. Implemented tactical sensor network operations on the developed advanced computer architectures used for algorithm/waveform analysis. | | 0.900 | 0.904 | 0.000 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | PROJECT NUMBER<br>63665A |

| B. Accomplishments/Planned Program ($ in Millions) | FY 2008 | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|---|
| In FY 2009: Demonstrate the surveillance performance of homogeneous sensor networks and newly developed adaptive processing algorithms and waveforms in heterogeneous conditions, including clutter and jamming interference.<br><br>In FY 2010: Not Applicable. | | | | |
| MAJOR THRUST: Develop and demonstrate technologies to provide precision position and timing information to enable distributed, layered sensing. Technologies include both Global Positioning Satellite (GPS) and non-GPS approaches, and must provide performance even in GPS-denied environments. Sensor size, weight, and power reduction will be pursued to allow installation on small as well as large air and space vehicles. Note: In FY 2010, this effort moved from Project 88SP to this project to better align efforts.<br><br>In FY 2008: Not Applicable.<br><br>In FY 2009: Not Applicable.<br><br>In FY 2010: Design reduced size, weight, and power precision time, position, and velocity sensor techniques for space-based, airborne, and ground-based applications. Demonstrate constructive systems engineering model to assess assured reference techniques in terms of measures of performance and warfighter utility. Enhance multi-ship virtual flight test simulation technology to assess world-wide distributed position, navigation, and timing architectures for disparate platforms enabling distributed, layered sensing. | 0.000 | 0.000 | 2.143 | |
| MAJOR THRUST: Develop infrared surveillance technologies for battlespace awareness space-based platforms using high altitude airborne platforms as a pathfinder. Note: In FY 2010, this effort moved from Project 88SP to this project to better align efforts.<br><br>In FY 2008: Not Applicable. | 0.000 | 0.000 | 0.944 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>63665A | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2009: Not Applicable.<br><br>In FY 2010: Initiate an effort to perform design studies and concept demonstration experiments for exploiting novel temporal, spectral, and polarimetric discrimination based on infrared sensors to rapidly detect, locate, identify, and characterize battlefield targets and events over broad theater-sized areas. | | | | | |
| MAJOR THRUST: Reduce technology risk for space sensor platform payload components and exploitation of infrastructure integration. Note: In FY 2010, this effort was moved from Project 88SP to this Project to better align efforts.<br><br>In FY 2008: Not Applicable.<br><br>In FY 2009: Not Applicable.<br><br>In FY 2010: Develop Mission Design Tool kit and experimental hardware for class III (scalable payloads) sensors. Begin to address PnP (Plug and Play) concepts for large satellite systems. | | 0.000 | 0.000 | 1.668 | |
| CONGRESSIONAL ADD: TACNODES.<br><br>In FY 2008: Conducted Congressionally-directed effort for TACNODES.<br><br>In FY 2009: Not Applicable.<br><br>In FY 2010: Not Applicable. | | 3.105 | 0.000 | 0.000 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | PROJECT NUMBER<br>63665A |

| B. Accomplishments/Planned Program ($ in Millions) | FY 2008 | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|---|
| CONGRESSIONAL ADD: Moving Target Strike.<br><br>In FY 2008: Not Applicable.<br><br>In FY 2009: Conduct Congressionally-directed effort for Moving Target Strike.<br><br>In FY 2010: Not Applicable. | 0.000 | 1.995 | 0.000 | |
| CONGRESSIONAL ADD: Precision Image Tracking and Registration.<br><br>In FY 2008: Not Applicable.<br><br>In FY 2009: Conduct Congressionally-directed effort for Precision Image Tracking and Registration.<br><br>In FY 2010: Not Applicable. | 0.000 | 1.596 | 0.000 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | PROJECT NUMBER<br>63665A |

**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 0602204F/ Aerospace Sensors. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603205F/ Flight Vehicle Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603707F/ Weather Systems Advanced Development. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603500F/ Multi-Disciplinary Advanced Development Space Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0602111N/ Weapons Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0602232N/ Space and Electronic Warfare (SEW) Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0604249F/ LANTIRN Night Precision Attack. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603270F/ Electronic Combat Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| Activity Not Provided/ A Memorandum of Agreement has been established between Air Force Research | 0.000 | 0.000 | | | | | | | Continuing | Continuing |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | | DATE: May 2009 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | PROJECT NUMBER<br>63665A |

| | | | | |
|---|---|---|---|---|
| Laboratory and Defense Adv<br>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<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | | | | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | | | PROJECT NUMBER<br>6369DF | |
| **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** |
| 6369DF: Target Attack and Recognition Technology | 31.317 | 34.823 | 24.153 | | | | | | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This project develops and demonstrates advanced technologies for attack management, fire control, and target identification and recognition. This includes developing and demonstrating integrated and cooperative fire control techniques to provide for adverse-weather precision air strikes against multiple targets per pass and at maximum weapon launch ranges. Specific fire control technologies under development include attack management, sensor fusion, automated decision aids, advanced tracking for low radar cross section threats, and targeting using both on-board and off-board sensor information. This project also evaluates targeting techniques to support theater missile defense efforts in surveillance and attack. These fire control technologies will provide force multiplication and reduce warfighter exposure to hostile fire. This project also develops and demonstrates target identification and recognition technologies for positive, high confidence cueing, recognition, and identification of airborne and ground-based, high-value, time-critical targets at longer ranges than are currently possible. The goal is to apply these technologies to tactical air-to-air and air-to-surface weapon systems so they are able to operate in all weather conditions, during day or night, and in high-threat, multiple target environments. Model-based vision algorithms and target signature development techniques are the key to target identification and recognition. This project is maturing these technologies in partnership with the Defense Advanced Research Projects Agency and evaluating the techniques to support theater missile defense efforts in surveillance and attack. Fire control and recognition technologies developed and demonstrated in this project are high leverage efforts, providing for significant advancements in operational capabilities largely through software improvements readily transitionable to new and existing weapon systems. Note: Funding in Major Thrusts within this project decreases in FY 2008 and FY 2009 as (1) technology is transitioned to operational platforms; and (2) several Major Thrusts are created resulting from other work in the project for better management and oversight.

| **B. Accomplishments/Planned Program ($ in Millions)** | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
|---|---|---|---|---|
| MAJOR THRUST: Develop and test an automatic target recognition system for tracking and identifying moving and stationary ground targets for use in strike and reconnaissance platforms. Note: The reduced emphasis in this thrust in FY 2009 is due to the transition of the technology to the warfighter.<br><br>In FY 2008: Performed a real-time laboratory demonstration of a radar based air-to-ground moving target algorithm for tactical and reconnaissance platforms. Assessed performance against scenarios of interest to the warfighter as would be integrated into candidate radar systems. Provided support to the transition of the moving target algorithm technology to operational strike and reconnaissance platforms as necessary. | 4.754 | 0.796 | 0.098 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>6369DF | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2009: Continue providing support to the transition of the moving target algorithm technology to operational strike and reconnaissance platforms.<br><br>In FY 2010: Complete the transition of moving target algorithm technology to operational strike and reconnaissance platforms. | | | | | |
| MAJOR THRUST: Develop and assess multi-sensor automatic target recognition for intelligence, surveillance, reconnaissance, strike, and weapon systems.<br><br>In FY 2008: Began spiral development and assessment of multi-sensor automatic target recognition fusion algorithms. Assessed technology supporting intelligence, surveillance, reconnaissance, strike, and weapon systems occurred in the Air Force automatic target recognition test and evaluation facility. Continued spiral development and validation of synthetic data generation capability critically needed to augment collected research, development, and operational data sets. Critically examined target, scene, and scenario data to determine independence and interdependence of features to support development of an optimum data fusion exploitation capability. Enhanced the Air Force automatic target recognition test and evaluation facility and data sets as required to support enhanced automatic target recognition fusion capabilities.<br><br>In FY 2009: Continue spiral development and assessment of multi-sensor automatic target recognition fusion algorithms. Continued assessment of technology supporting intelligence, surveillance, reconnaissance, strike, and weapon systems using the Air Force automatic target recognition test and evaluation facility. Continue spiral development and validation of synthetic data generation capability critically needed to augment collected research, development, and operational data sets. Develop automatic target recognition fusion sensor data exploitation capability utilizing analysis and experimentation of data independence and interdependence of features to support development of an optimum data fusion exploitation capability. Enhance the Air Force automatic target recognition test and evaluation facility and data sets as required to support enhanced automatic target recognition fusion capabilities. Determine technology shortfalls and develop automatic target recognition fusion technologies to overcome these shortfalls. | | 3.800 | 2.089 | 1.961 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>6369DF | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2010: Continue spiral development and assessment of multi-sensor automatic target recognition fusion algorithms. Continued assessment of technology supporting intelligence, surveillance, reconnaissance, strike, and weapon systems using the Air Force automatic target recognition test and evaluation facility. Continue spiral development and validation of synthetic data generation capability critically needed to augment collected research, development, and operational data sets. Continue development of an automatic target recognition fusion sensor data exploitation capability utilizing analysis and experimentation of data independence and interdependence of features to support development of an optimum data fusion exploitation capability. Enhance the Air Force automatic target recognition test and evaluation facility and data sets as required to support enhanced automatic target recognition fusion capabilities. Determine technology shortfalls and develop automatic target recognition fusion technologies to overcome these shortfalls. Execute a laboratory demonstration of technology developed to date. | | | | | |
| MAJOR THRUST: Develop and demonstrate a moderate-confidence automatic target recognition (ATR) and advanced cueing capability for stationary and moving targets.<br><br>In FY 2008: Developed and evaluated an initial design of multi-sensor fusion algorithms that use change detection techniques to improve target detection and reduce false alarms for higher clutter areas. Developed and evaluated an initial design of a three-dimensional laser-detection-and-ranging automatic target recognition algorithm designed to achieve high confidence identification against targets in various degrees of clutter. Developed and evaluated an initial design of a laser vibrometry algorithm that provide the ability to determine target state (for example, engine on/off) and provide some level of counter denial and deception capability. Developed and evaluated an initial design of a sensor management suite that provides target cue prioritizations and look geometry optimization for three-dimensional laser-detection-and-ranging sensors. Developed and evaluated an initial set of exploitation tools that are optimized for use with three-dimensional laser-detection-and-ranging and laser vibrometry sensors. Enhanced automatic target recognition evaluation test facility and data sets as necessary to support program requirements. | | 7.871 | 6.722 | 2.794 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>6369DF | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2009: Incorporate improvements in the initial design of the multi-sensor fusion algorithms for improved detection that were previously evaluated. Incorporate improvements in the initial design of the three-dimensional laser-detection-and-ranging automatic target recognition algorithms that were previously evaluated. Incorporate improvements in the initial design of the laser vibrometry algorithms that were previously evaluated. Incorporate improvements in the initial design of the sensor management suite that were previously evaluated. Incorporate improvements in the initial set of laser sensor exploitation tools that were previously evaluated. Enhance automatic target recognition evaluation test facility and data sets as necessary to support program requirements.<br><br>In FY 2010: Develop an electro-optic enhanced automatic target recognition system based on improvements provided by the multi-sensor fusion algorithms, the three-dimensional laser-detection-and-ranging automatic target recognition algorithms that were previously evaluated, the laser vibrometry algorithms and the sensor management suite that were previously evaluated. Enhance laser sensor exploitation tools as required to support spiral ATR development. Enhance automatic target recognition evaluation test facility and data sets as necessary to support program requirements. | | | | | |
| MAJOR THRUST: Develop and demonstrate an automatic target recognition capability integrated with advanced geo-registration techniques and innovative change detection algorithms.<br><br>In FY 2008: Continued spiral assessment and development of automatic target recognition, automatic target cueing, geo-registration, and change-detection technology. Assessed technology supporting time-critical targeting systems in the Air Force automatic target recognition test and evaluation facility. Continued spiral development and validation of synthetic data generation capabilities critically needed to augment collected research, development, and operational data sets. Performed interim demonstration and evaluation of concealed target identification sensing and exploitation technologies. Performed interim demonstration and evaluation of advanced tracking and multi-sensor track maintenance technology in a militarily significant scenario. Enhanced the Air Force automatic target recognition test and evaluation facility and data sets as required to support time-critical targeting capabilities. | | 2.568 | 1.364 | 1.041 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | PROJECT NUMBER<br>6369DF |

| B. Accomplishments/Planned Program ($ in Millions) | FY 2008 | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|---|
| In FY 2009: Determine need to continue spiral assessment and development of automatic target recognition, automatic target cueing, geo-registration, and change detection technology. Continue assessment of technology supporting time-critical targeting systems in the Air Force automatic target recognition test and evaluation facility. Continue spiral development and validation of synthetic data generation capability critically needed to augment collected research, development, and operational data sets. Demonstrate time-critical targeting, advanced target tracking and multi-sensor track maintenance capabilities. Enhance the Air Force automatic target recognition test and evaluation facility and data sets as required to support enhanced time-critical targeting capabilities. Determine technology shortfalls and develop emerging time-critical targeting and advanced target tracking technologies to overcome these shortfalls.<br><br>In FY 2010: Assess performance of developed technology and develop enhancements to automatic target recognition, automatic target cueing, geo-registration, and change detection technology to meet warfighter needs. Continue assessment and enhancement of technology supporting time-critical targeting systems in the Air Force automatic target recognition test and evaluation facility. Continue spiral development and validation of synthetic data generation capability critically needed to augment collected research, development, and operational data sets. Enhance the Air Force automatic target recognition test and evaluation facility and data sets as required to support enhanced time-critical targeting capabilities. Continue spiral development and assessment development of time-critical targeting and advanced target tracking technologies required to meet warfighter requirements. | | | | |
| MAJOR THRUST: Develop an "identify friend, foe, or neutral" air-to-ground capability using cooperative and non-cooperative identification techniques.<br><br>In FY 2008: Integrated and demonstrated improved ground target identification capabilities through enhanced target databases, identification algorithm advancements, and radio-frequency tags in a laboratory environment. Assessed maturity of technology via a combination of exercises and scientific analysis by the Air Force automatic target recognition evaluation test facility. Initiated spiral assessment and development of an "identify friend, foe, or neutral" air-to-ground capability, enhancing test facilities and target databases as necessary. Planned operational exercise support. | 2.585 | 2.462 | 1.395 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>6369DF | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2009: Continue to integrate and demonstrate improved ground target identification capabilities through enhanced target databases, identification algorithm advancements, and radio-frequency tags in an operational environment. Assess performance of technology to support warfighter integration with operational systems. Continue refinement of identification algorithms and target databases as necessary to support transition of technology.<br><br>In FY 2010: Integrate, demonstrate, and assess, in an operational environment, the improved ground target identification capabilities through enhanced target databases, identification algorithm advancements, and radio-frequency tags. Determine enhancements required to attain the required performance of these technologies to support warfighter needs. Continue refinement of identification algorithms, target databases, and exploitation tools as necessary to support transition of technology. | | | | | |
| MAJOR THRUST: Develop wide angle, continuous staring, multi-sensor/multi-wavelength sensing and automated exploitation technology that provides detection, tracking, and identification of numerous objects of possible military significance over very large ground areas at sensor data update rates. Note: This work is an outgrowth of other work within this project.<br><br>In FY 2008: Designed and breadboarded the individual waveband sensors required to support the persistent staring and automated exploitation capability. Collected data required to support the development, testing, and validation of the automated exploitation of the wide angle, continuous staring capability. Assessed the maturity of the technology through scientific analyses conducted in the Air Force automatic target recognition test and evaluation facility.<br><br>In FY 2009: Design and develop engineering models of the multi-sensor, multi-wavelength wide-angle, continuously-staring capability building upon the technologies developed during the individual component stage. Integrate and demonstrate the wide angle, continuously-staring component technologies. Assess the maturity of the technology via a combination of exercises and scientific analyses in the Air Force automatic target recognition test and evaluation facility. Initiate spiral development of wide angle, continuous staring | | 5.691 | 5.999 | 6.572 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>6369DF | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| exploitation algorithms, phenomenological modeling, target and scenario databases necessary to support transition to the warfighter. Initiate Secretary of the Air Force Interest Item to develop electro-optical, infrared, and synthetic aperture radar staring-sensor technologies and algorithms.<br><br>In FY 2010: Develop, integrate, and test the next spiral engineering model of the multi-sensor, multi-wavelength wide-angle, continuously-staring capability building upon the technologies developed during the individual component stage. Integrate, demonstrate, and test the enhanced, spiral two, wide angle, continuously-staring component technologies via a combination of exercises and scientific analyses in the Air Force automatic target recognition test and evaluation facility. Continue spiral development of wide angle, continuous staring exploitation algorithms, phenomenological modeling, target and scenario databases necessary to support transition to the warfighter. Demonstrate in a militarily significant scenario, evaluate results and plan for transition. | | | | | |
| MAJOR THRUST: Develop an advanced suite of sensors with automatic target recognition, fusion, and target tracking, all working in concert to provide a high-confidence identification capability. Note: This work is an outgrowth of other work within this project.<br><br>In FY 2008: Initiated spiral development of high confidence identification algorithm for phenomenological modeling, and target and scenario databases necessary to support technology development.<br><br>In FY 2009: Design and test an advanced aimpoint tracking capability. Develop and test automatic target recognition capability using electro-optical sensor data. Build upon previous synthetic aperture radar automatic target recognition capability to develop a high confidence exploitation of synthetic aperture radar data. Develop an advanced capability to fuse information and exploitation results from multiple sensors. Continue spiral high confidence identification development of algorithm phenomenological modeling, target and scenario databases necessary to support technology development. Assess maturity of technology during the spiral process via the Air Force automatic target recognition test and evaluation facility and other sensor test facilities. | | 0.167 | 10.603 | 9.909 | |
| | | | | | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | PROJECT NUMBER<br>6369DF |

| B. Accomplishments/Planned Program ($ in Millions) | FY 2008 | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|---|
| In FY 2010: Integrate the advanced aimpoint tracking, electro-optical automatic target recognition, synthetic aperture radar automatic target recognition and the multi-sensor fusion algorithms. Test the integrated system and develop the second spiral requirements. Enhance phenomenological modeling, target and scenario databases and exploitation tools necessary to support spiral two technology development. Assess maturity of technology during the spiral process via the Air Force automatic target recognition test and evaluation facility and other sensor test facilities. | | | | |
| MAJOR THRUST: Investigate the application of airborne target ID techniques and algorithms to space object identification and characterization. Airborne technology for multi-sensor data fusion for better characterization will be investigated. Note: In FY 2010, this effort moved from Project 88SP to this project to better align efforts.<br><br>In FY 2008: Not Applicable.<br><br>In FY 2009: Not Applicable.<br><br>In FY 2010: Initiate an effort to process multiple sources of ground based space situational awareness (SSA) data on various space objects using upgraded space object ID algorithms for validation, along with upgrades to a space object ID database. | 0.000 | 0.000 | 0.383 | |
| CONGRESSIONAL ADD: Active Unmanned Air Vehicle (UAV) Phenomenology (AUP) & ART Technology Transition.<br><br>In FY 2008: Conducted Congressionally-directed effort for Active Unmanned Air Vehicle (UAV) Phenomenology (AUP) & ART Technology Transition.<br><br>In FY 2009: Conduct Congressionally-directed effort for Active Unmanned Air Vehicle (UAV) Phenomenology (AUP) & ART Technology Transition. | 3.881 | 1.995 | 0.000 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | PROJECT NUMBER<br>6369DF |

| B. Accomplishments/Planned Program ($ in Millions) | FY 2008 | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|---|
| In FY 2010: Not Applicable. | | | | |
| CONGRESSIONAL ADD: Automated Sensor-Communication Response Technology.<br><br>In FY 2008: Not Applicable.<br><br>In FY 2009: Conduct Congressionally-directed effort for Automated Sensor-Communication Response Technology.<br><br>In FY 2010: Not Applicable. | 0.000 | 1.596 | 0.000 | |
| CONGRESSIONAL ADD: Reconfigurable Secure Computing Technologies.<br><br>In FY 2008: Not Applicable.<br><br>In FY 2009: Conduct Congressionally-directed effort for Reconfigurable Secure Computing Technologies.<br><br>In FY 2010: Not Applicable. | 0.000 | 1.197 | 0.000 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | PROJECT NUMBER<br>6369DF |

**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 0602204F/ Aerospace Sensors. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603253F/ Advanced Sensor Integration. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603500F/ Multi-Disciplinary Advanced Space Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603762E/ Sensor and Guidance Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603270F/ Electronic Combat Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| Activity Not Provided/ Theater Missile Defense System Program Office. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| Activity Not Provided/Low Altitude Night Targeting and Infrared Navigation (LANTIRN) System Program Office. | 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 |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | PROJECT NUMBER<br>6369DF |

**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<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | | | | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | | | PROJECT NUMBER<br>6388SP | |
| **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** |
| 6388SP: Advanced Space Sensors | 12.247 | 10.212 | 0.000 | | | | | | Continuing | Continuing |

**Note**

Note: In FY 2010, funds from Project 88SP are being moved to Projects 665A and 69DF to better align efforts.

**A. Mission Description and Budget Item Justification**

This project develops and demonstrates space sensor technologies, including radio frequency sensors; intelligence, surveillance, and reconnaissance sensors; electro-optical sensors; laser warning sensors; targeting and attack radar sensors; and electronic counter-countermeasures and communications. By developing multi-function radar, laser, electronic combat, and electronic counter-countermeasures technologies for space applications, this project provides space platforms with the capability to precisely detect, track, and target air- and ground-based, high-value, time-critical targets, while remaining invulnerable to hostile and natural threats.

| B. Accomplishments/Planned Program ($ in Millions) | FY 2008 | FY 2009 | FY 2010 | FY 2011 |
|---|---|---|---|---|
| MAJOR THRUST: Reduce technology risk for space sensor platform payload components and exploitation of infrastructure integration.<br><br>In FY 2008: Developed approach to design responsive space payload capabilities while retaining hardware implementation feasibility. Defined payload to bus satellite interface requirements and standards.<br><br>In FY 2009: Develop "plug-and-play" satellite critical experiment, to including full simulation.<br><br>In FY 2010: Not Applicable. | 0.457 | 0.835 | 0.000 | |
| MAJOR THRUST: Develop and demonstrate technologies to maximize global positioning system jam resistance, positional accuracy, timing accuracy, and exploitation techniques to improve offensive and defensive combat capabilities. | 1.289 | 2.186 | 0.000 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>6388SP | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2008: Designed space-based distributed position, navigation, and timing technologies to detect, identify, and locate global positioning system threats. Designed multi-ship virtual flight test simulation technology to assess networked clusters of unmanned aerial vehicles, intelligence, surveillance, and reconnaissance platforms, and space-based platforms.<br><br>In FY 2009: Demonstrate space-based distributed position, navigation, and timing technologies to achieve optimal sensor fusion for distributed, layered sensing. Demonstrate multi-ship virtual flight test simulation technology to assess world-wide distributed position, navigation, and timing architectures for disparate platforms across distributed, layered sensing.<br><br>In FY 2010: Not Applicable. | | | | | |
| MAJOR THRUST: Develop electro-optical sensor component technology to advance multiple space mission areas. Develop new sensor components, topologies and architectures for space.<br><br>In FY 2008: Conducted experimental space flight of sensor components to test in space environment. Initiated data collection, testing, and system evaluation with relevant space environment phenomenology.<br><br>In FY 2009: Complete experimental space flight of sensor components to test in space environment. Complete data collection, testing, and system evaluation. Initiate lab-based integration testing with embedded satellite components.<br><br>In FY 2010: Not Applicable. | | 1.615 | 1.512 | 0.000 | |
| MAJOR THRUST: Develop advanced laser communication component and sub-system technology to support a network-level topology for airborne intelligence, surveillance, and reconnaissance. | | 6.349 | 5.000 | 0.000 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 | | | |
|---|---|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | | | PROJECT NUMBER<br>6388SP | |
| **B. Accomplishments/Planned Program ($ in Millions)** | | **FY 2008** | **FY 2009** | **FY 2010** | **FY 2011** |
| In FY 2008: Continued development of an integrated wideband radio-frequency/electro-optical communication terminal and shared aperture antenna. Began evaluation and testing of the integrated terminal and antenna in an air network layer. Began maturation of technologies for integration into airborne network communication architecture. Continued flight demonstrations of optical communication terminal technologies for air-network layers.<br><br>In FY 2009: Continue maturation of technologies for integration into airborne network communication architecture. Conduct further ground and flight tests of laser communication system. Continue development of advanced Free Space Optical Modem focusing on compact packaging for Airborne Terminal Rack (ATR) rack installations. Integrate Optical terminal with RF communications gear to enable testing of hybrid free space optical and radio-frequency communications terminal for Intelligence Surveillance and Reconnaissance (ISR) relay missions. Demonstrate hybrid free space optical/radio frequency failsafe/failback operations in airborne tests. This effort ends in FY 2009.<br><br>In FY 2010: Not Applicable. | | | | | |
| MAJOR THRUST: Develop and demonstrate a geodesic phased array antenna to achieve enhanced satellite operations over current reflector antennas. Improve operational capacity and efficiency to support satellite control network.<br><br>In FY 2008: Fabricated transmit/receive modules, radiating elements, beam former array panels for the geodesic phased array antenna dome sub-sector to be used in the advanced technology demonstration.<br><br>In FY 2009: Fully characterize the advanced technology demonstrator sub-sector and demonstrate with operational satellites. This effort is complete in FY 2009.<br><br>In FY 2010: Not Applicable. | | 2.537 | 0.679 | 0.000 | |

| Exhibit R-2a, PB 2010 Air Force RDT&E Project Justification | | DATE: May 2009 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>3600 - Research, Development, Test & Evaluation, Air Force/BA 3 - Advanced Technology Development (ATD) | R-1 ITEM NOMENCLATURE<br>PE 0603203F Advanced Aerospace Sensors | PROJECT NUMBER<br>6388SP |

**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 0602204F/ Aerospace Sensors. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0602500F/ Multi-Disciplinary Space Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603500F/ Multi-Disciplinary Advanced Development Space Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| PE 0603270F/ Electronic Combat Technology. | 0.000 | 0.000 | | | | | | | Continuing | Continuing |
| Activity Not Provided/ This project has been coordinated through the Reliance process to harmonize efforts and eliminate du | 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.