PE NUMBER: 0602204F
PE TITLE: Aerospace Sensors

Exhibit R-2, RDT&E Budget Item Justification

DATE: **February 2006**

BUDGET ACTIVITY: **02 Applied Research**

PE NUMBER AND TITLE: **0602204F Aerospace Sensors**

	Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
	Total Program Element (PE) Cost	92.597	115.689	117.553	105.531	109.491	110.436	111.836	Continuing	TBD
2002	Electronic Component Technology	18.486	22.952	26.910	23.795	24.609	24.109	23.551	Continuing	TBD
2003	EO Sensors & Countermeasures Tech	17.639	22.551	16.495	15.305	16.238	16.435	16.627	Continuing	TBD
44SP	Space Sensors	0.000	0.000	8.882	10.615	10.059	10.225	10.380	Continuing	TBD
4916	Electromagnetic Tech	17.608	15.606	14.333	11.838	12.513	13.054	13.680	Continuing	TBD
5016	Photonic Component Technology	2.869	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
5017	RF Processing for ISR Sensors	7.482	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
6095	Sensor Fusion Technology	13.019	17.061	17.548	15.978	16.405	16.618	16.838	Continuing	TBD
7622	RF Sensors & Countermeasures Tech	15.494	37.519	33.385	28.000	29.667	29.995	30.760	Continuing	TBD

Note: In FY 2006, efforts in Project 5016 will transfer to Project 2002 within this PE. Also in FY 2006, efforts in Project 5017 will transfer to Project 7622 within this PE. In FY 2007, Project 44SP, Space Sensors, efforts will transfer from PE 0602500F, Multidisciplinary Space Technology, Project 5028, Space Sensors, Photonics and RF Processors, and Project 5029, Space Sensor and CM Technology, in order to more effectively manage and provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This program develops the technology base for Air Force aerospace sensors and electronic combat. Advances in aerospace sensors are required to increase combat effectiveness by providing "anytime, anywhere" surveillance, reconnaissance, precision targeting, and electronic warfare capabilities. To achieve this progress, this program pursues simultaneous advances in: 1) generating, controlling, receiving, and processing electronic and photonic signals for radio frequency (RF) sensor aerospace applications; 2) electro-optical (EO) aerospace sensor technologies for a variety of offensive and defensive uses; 3) RF antennas and associated electronics for airborne and space surveillance, together with active and passive electro-optical sensors; 4) technologies to manage and fuse on-board sensor information for timely, comprehensive situational awareness; and 5) technology for reliable, all-weather surveillance, reconnaissance, and precision strike RF sensors and electronic combat systems. Note: In FY 2006, Congress added $2.0 million for 3-D Packaging Technology for High Speed RF; $1.0 million for Phased Array Antenna Control Computer; $4.2 million for Watchkeeper; $1.2 million for the Center for Advanced Sensor and Communications Antennas; $3.3 million for Super-resolution Sensor System; $1.8 million for Minority LEADERS Research Program; $1.0 million for Compact, Ultra-Sensitive Optical Receiver for Smart and Loitering Standoff Weapons; $1.0 million for Stable Articulating Backbone for Ultralight Radar (SABUR); $1.0 million for OMEV; $1.0 million for OPAL; $1.0 million for Advanced Sensor-based Vigilance Technologies; and $5.6 million for Small Disadvantaged Business, Historically Black Colleges and Universities. This program is in Budget Activity 2, Applied Research, since it develops and determines the technical feasibility and military utility of evolutionary and revolutionary sensor, electronics, and electronic combat technologies.

Exhibit R-2, RDT&E Budget Item Justification	DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors

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

		FY 2005	FY 2006	FY 2007
(U)	Previous President's Budget	93.376	93.263	94.486
(U)	Current PBR/President's Budget	92.597	115.689	117.553
(U)	Total Adjustments	-0.779	22.426	
(U)	Congressional Program Reductions			
	Congressional Rescissions	-0.071	-1.674	
	Congressional Increases		24.100	
	Reprogrammings			
	SBIR/STTR Transfer	-0.708		
(U)	Significant Program Changes:			

Not Applicable.

C. Performance Metrics

Under Development.

Exhibit R-2a, RDT&E Project Justification			DATE: February 2006
BUDGET ACTIVITY: 02 Applied Research	PE NUMBER AND TITLE: 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE: 2002 Electronic Component Technology	

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
2002 Electronic Component Technology	18.486	22.952	26.910	23.795	24.609	24.109	23.551	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2006, efforts in Project 5016 will transfer to this project in order to more effectively manage and provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This project focuses on generating, controlling, receiving, and processing electronic signals for radio frequency (RF) sensor aerospace applications. The enabling technologies developed under this project will be used for intelligence, surveillance, reconnaissance (ISR), electronic warfare (EW), battlespace access, and precision engagement capabilities. The technologies developed include: exploratory device concepts, solid state power devices and amplifiers; low noise and signal control components; photonic components; high-temperature electronics; signal control and distribution; signal processing; multi-function monolithic integrated circuits; high-speed analog-to-digital and digital-to-analog mixed mode integrated circuits; reconfigurable electronics; power distribution; multi-chip modules; and high density packaging and interconnect technologies. This project also designs, develops, fabricates, and evaluates techniques for integrating combinations of these electronic component technologies. The project aims to demonstrate significantly improved military sensors of smaller size, lower weight, lower cost, lower power dissipation, higher reliability, and improved performance. The device and component technology developments under this project are military unique; they are based on Air Force and other Department of Defense weapon systems requirements in the areas of radar, communications, EW, navigation, and smart weapons.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop compact, affordable, multi-function receiver/exciter and phased array components for communications, Global Positioning System, radar, EW, and ISR sensors. Develop advanced aperture subsystems that support affordable and scalable antenna arrays, as well as enable efficient wideband, multi-function sensors for radar, EW, and communications. Develop receiver and exciter subsystem technologies that enable compact, affordable, multi-function, multi-beam radar and EW systems.	4.908	5.489	9.642

(U) In FY 2005: Developed a digital beamforming (DBF) receiver architecture addressing issues specific to DBF systems, such as coherence of multiple channels, support for digital true time delay, channel equalization, and array calibration. Evaluated affordable DBF-specific Gallium Arsenide (GaAs) RF components (analog-to-digital converters, filters, mixers, etc.) with the technology upgrade plan for Indium Phosphate (InP) RF components into radar and EW digital receiver modules.

(U) In FY 2006: Demonstrate low cost, lightweight subpanel for phased array radar applications. Demonstrate an affordable, compact receiver-on-a-chip by leveraging advances in commercial Silicon Germanium (SiGe) technology for multifunction and reconfigurable sensor systems.

(U) In FY 2007: Develop scalable panel demonstration with multiple panel communication and metrology. Design and demonstrate a distributed receiver/exciter architecture for advanced multifunction systems used in radar and EW sensors for ISR and battlespace access capabilities.

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 2002 Electronic Component Technology

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)				
(U)	MAJOR THRUST: Develop new microelectronic component technologies for radar, EW, and communications to support ISR, precision strike and battlespace access capabilities using advances in material research and microelectronic fabrication techniques.	0.792	1.136	2.261
(U)	In FY 2005: Developed and demonstrated the proof of concept of limited subarrays and advanced device technologies that are able to withstand extreme temperature and signal environments.			
(U)	In FY 2006: Develop engineering model of advanced photonic modulation components for low loss signal distribution. Demonstrate integrated photonic microsystems.			
(U)	In FY 2007: Develop high performance RF circuits on lightweight and conformal substrates using advanced semiconducting materials and devices.			
(U)				
(U)	MAJOR THRUST: Develop integration and assembly technologies for high performance aerospace phased array sensors. Design and model photonic component technologies for RF distribution and signal processing. Note: Effort completes in FY 2006	1.847	2.865	0.000
(U)	In FY 2005: Developed and demonstrated the complex integration of multiple functions on flexible RF substrates for application on conformal surfaces such as those found on aerospace vehicles.			
(U)	In FY 2006: Design and fabricate advanced components for external and direct modulation of optical sources with high efficiency for RF photonic links used in radar and communications. Demonstrate optical modulation technology with high linearity and dynamic range for ISR, battlespace access, and time-sensitive targeting capabilities.			
(U)	In FY 2007: Not Applicable			
(U)				
(U)	MAJOR THRUST: Develop signal control and low-power consumption components and techniques to reduce both power loss and power consumption for future radar, electronic warfare, and ISR sensors. Develop and integrate adaptable circuit technologies which utilize dynamic elements and low loss signal control for multi-function radar and EW sensors used for ISR and battlespace access capabilities. Develop wideband (multi-octave) component technologies for multi-function RF apertures used in radar and EW sensor systems.	4.303	6.744	10.061
(U)	In FY 2005: Developed new transmit and receive channel technology using advanced semiconductor integration techniques.			
(U)	In FY 2006: Design, implement and characterize low insertion loss tunable filters for advanced RF multifunction front ends. Demonstrate RF transistors with five-fold reduction in parasitic capacitance for equivalent power output. Design and demonstrate Gallium Nitride (GaN) based field-effect devices with enhanced power handling			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 2002 Electronic Component Technology

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	capabilities.			
(U)	In FY 2007: Develop and demonstrate adaptable microcircuits for multi-function applications. Characterize and transition reliable wideband power amplifiers for multifunction radar and EW sensor applications. Characterize high reliability GaN based circuits for millimeter wave and Q-band applications.			
(U)				
(U)	MAJOR THRUST: Refine materials and processes for two-dimensional and three-dimensional device interconnects and component protection from the environment. Develop and demonstrate innovative RF component technology that lowers system cost through reduction of design costs, part count, chip size, production costs, and integration costs.	1.054	0.982	0.844
(U)	In FY 2005: Demonstrated and evaluated a two-fold decrease in the cost and size of the mixed-signal assemblies.			
(U)	In FY 2006: Develop advanced component characterization techniques to assess and mitigate failures in emerging semiconductor technologies and to develop predictive failure models.			
(U)	In FY 2007: Design and implement military specific RF components using advanced circuit compaction techniques and latest commercial foundry advances. Characterize and perform trade-space analysis with respect to traditional RF component technologies.			
(U)				
(U)	MAJOR THRUST: Evaluate the integrated tool suite in the modeling, simulation, design, and characterization environment for mixed-signal (digital, RF, microwave, etc.) component development in both advanced and emerging electronic component technologies.	1.582	3.765	4.102
(U)	In FY 2005: Evaluated system-in-a-package/system-on-a-chip tool suite for the modeling, simulation, design, and characterization of mixed-signal (digital, RF, microwave, etc.) components developed for advanced mixed-signal technologies (silicon-on-insulator (SOI), SiGe, Antimonides, InP). Tested in a laboratory environment breadboard SOI and SiGe signal conversion components designed for narrow band (Global Positioning System, air moving target indication) aerospace applications.			
(U)	In FY 2006: Model and transition electrostatic adaptable microsystems for dense signal environments.			
(U)	In FY 2007: Design and initial modeling of next generation wideband gap devices for high power, high temperature, and broadband multi-function systems.			
(U)				
(U)	CONGRESSIONAL ADD: 3-D Packaging for High Speed Radio Frequency (RF).	2.000	1.971	0.000
(U)	In FY 2005: Designed, fabricated and demonstrated an experimental design for 3-D radio frequency sensing microcircuits for military communication, radar, and electronic warfare sensor applications.			
(U)	In FY 2006: Conduct Congressionally-directed effort for 3-D Packaging for High Speed RF.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 2002 Electronic Component Technology

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: General Purpose Reconfiguration Signal Processors System.	2.000	0.000	0.000
(U)	In FY 2005: Fully characterized the miniature on-board signal processor feasibility unit. Developed an ISR application specific miniature signal processor that met form, fit, and function requirements.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	Total Cost	18.486	22.952	26.910

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(U) PE 0603203F, Advanced Aerospace Sensors.									
(U) PE 0603270F, Electronic Combat Technology.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: **February 2006**

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE
02 Applied Research	**0602204F Aerospace Sensors**	**2003 EO Sensors & Countermeasures Tech**

Cost ($ in Millions)		FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
2003	EO Sensors & Countermeasures Tech	17.639	22.551	16.495	15.305	16.238	16.435	16.627	Continuing	TBD
	Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This project determines the technical feasibility of advanced electro-optical (EO) aerospace sensor technologies for a variety of offensive and defensive uses. The sensor technologies under development range from the ultraviolet through the infrared (IR) portion of the spectrum. Related efforts include improvements in avionics integration, digital processing, analysis tools, and sensor architectures. One of the project's main goals is to improve EO and related technologies for the detection, tracking, and identification of non-cooperative and difficult targets, such as those obscured by camouflage. This project also develops the passive and active hyperspectral imaging sensors and algorithms needed to enable precision targeting in severe weather. These technologies are critical to future aerospace surveillance and targeting. Other project goals include advanced EO threat warning and countermeasures.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop technology for non-cooperative identification of airborne and ground-based platforms.	2.805	1.905	2.253

(U) In FY 2005: Conducted ground- and air-based testing and demonstrated advanced combat identification (CID) systems with multi-spectral, polarization-based detection and cueing, and active EO target long-range combat identification sensors. Completed integration of advanced 3-D focal planes and algorithms in concept design of high altitude system and performed technology demonstrations in relevant configurations. Extended passive hyperspectral model to emissive spectral region and performed validation experiments with flying testbed. Extended passive EO/IR enhancements by incorporating passive polarization techniques into both modeling and performance assessments. Developed EO system architectures for layered sensing based on multiple platform types for deep penetration and continuous target area coverage.

(U) In FY 2006: Expand ground- and air-based testing and demonstration of advanced CID systems with multi-spectral, polarization-based detection and cueing and active EO combat identification sensors to include 3-D imaging. Begin development of hybrid focal planes and read-out electronics capable of simultaneous multi-discriminant sensing. Complete EO/IR system architectures for layered sensing based on multiple platform types for deep penetration and continuous area coverage.

(U) In FY 2007: Perform off-board cued ground- and air-based testing and demonstration of advanced CID systems with multi-spectral, polarization-based target re-acquisition and active EO interrogation for combat identification including 3-D imaging and vibration sensing. Continue development of hybrid focal planes and read-out electronics capable of simultaneous multi-discriminant sensing. Begin demonstration of EO/IR system architectures for layered sensing based on multiple platform types for deep penetration and continuous area coverage.

(U)

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 2003 EO Sensors & Countermeasures Tech

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	MAJOR THRUST: Develop optical transmitter technology capable of sensing multiple target characteristics for robust non-cooperative target identification.	2.326	3.121	5.713
(U)	In FY 2005: Evaluated performance of multi-function pulsed vibration/imaging sensing system for long-range CID. Completed breadboard active multi-spectral transmitter and evaluated performance for both hard and extended targets. Developed flight capable, long-range, multi-function brassboard sensor. Tailored flight test platform to support testing of long-range air-to-air and air-to-ground systems under development. Performed initial flights for pulsed vibrometer CID sensor.			
(U)	In FY 2006: Begin testing of optical transmitter technologies capable of sensing multiple target characteristics for robust non-cooperative target identification. Begin development of adaptable waveforms for multi-discriminant sensing. Begin laboratory and field tests and utility analysis of multi-function pulsed vibration/imaging sensing system and evaluate performance for long range CID. Perform initial flights for pulsed gated imager and vibration CID sensor. Test breadboard active multi-spectral transmitter and evaluate performance for both hard and extended targets. Continue flight capable, long-range, multi-function brassboard sensor development. Utilize flight test platform to support testing of long-range air-to-air and air-to-ground systems under development. Collect simultaneous passive and multi-function active sensing phenomenology data in airborne environment for difficult target detection analysis including diverse background characterization.			
(U)	In FY 2007: Continue development and testing of optical transmitter technologies including waveforms capable of sensing multiple target characteristics for robust non-cooperative target identification. Continue laboratory and field tests and utility analysis of multi-function pulsed vibration/imaging sensing system and evaluate performance for long-range CID. Perform flight data collections for pulsed gated imager and vibration CID sensor. Complete testing of breadboard active multi-spectral transmitter and evaluate performance for both hard and extended targets. Continue flight capable, long-range, multi-function engineering model sensor development. Utilize flight test platform to support testing of long-range air-to-air and air-to-ground systems under development. Continue collection of simultaneous passive and multifunction active sensing phenomenology data in airborne environment for difficult target detection analysis including diverse background characterization.			
(U)				
(U)	MAJOR THRUST: Develop innovative techniques and components to target difficult objects in degraded atmospheric conditions.	7.314	4.894	4.284
(U)	In FY 2005: Completed high altitude active sensor performance specification and concept design. Completed the evaluation and demonstration of non-mechanical beam steering concepts for high altitude sensor applications including precision pointing, focusing, and wavefront correction. Developed and demonstrated combined EO/radio frequency (RF) aperture. Conducted tests, analysis and evaluation of specialized multi-function laser radar			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 2003 EO Sensors & Countermeasures Tech

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	(LADAR) for detection and characterization of difficult targets. Collected simultaneous passive and multi-function active sensing phenomenology data for analysis of difficult target detection. Defined architecture for advanced EO unmanned aerial vehicle (UAV) based systems to find, fix, and identify difficult targets in challenging environments including the urban environment. Studied integration techniques for combining active and passive EO/IR for enhanced search, detection, location, and identification.			
(U)	In FY 2006: Begin development of techniques and components to target difficult objects in degraded atmospheric conditions. Integrate and evaluate weather/obscurant penetration concepts. Evaluate utility of non-mechanical beam steering concepts for advanced multi-mode sensor applications including precision pointing, focusing, and wavefront correction and extend to common EO/RF aperture implementation. Continue development and demonstrations of combined EO/RF aperture including preliminary sensor configuration. Continue tests, analysis, and evaluation of specialized multi-function LADAR for detection and characterization of difficult targets. Complete optimized architecture definition for advanced EO UAV based systems to find, fix, and identify difficult targets in difficult environments including the urban environment. Incorporate advanced passive and multi-function active sensing methods to exploit all salient target and background phenomenologies. Perform target phenomenology investigations.			
(U)	In FY 2007: Continue development and begin demonstration of techniques and components to target difficult objects in degraded atmospheric conditions. Integrate and evaluate weather/obscurant penetration concepts into system level tests. Demonstrate utility of non-mechanical beam steering for advanced multi-mode sensor applications, including precision pointing, focusing, and wavefront correction. Continue development and demonstrations of combined EO/RF apertures including preliminary sensor configuration. Continue analysis and evaluation of specialized multi-function 3-D LADAR for detection and characterization of difficult targets. Explore implementation of advanced architectures for advanced EO UAV-based systems to find, fix, and identify difficult targets in challenging environments including the urban environment. Incorporate advanced passive and multifunction active sensing methods to exploit all salient target and background phenomenologies. Continue target phenomenology investigations.			
(U)				
(U)	MAJOR THRUST: Develop countermeasure technologies for use against IR- and EO-guided missile threats.	0.797	2.498	2.400
(U)	In FY 2005: Developed specifications for countermeasure techniques to defeat first generation imaging missile seekers. Exploited advanced infrared sensor technology for countermeasure technique refinement. Characterized an imaging missile seeker to establish target-tracking capabilities.			
(U)	In FY 2006: Evaluate countermeasure techniques to defeat first generation IR imaging missile seekers. Continue the exploitation of advanced IR missiles and IR sensor technology for countermeasure technique updates and refinement.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 2003 EO Sensors & Countermeasures Tech

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	Initiate development of active sensing technology to defeat multi-band IR sensors.			
(U)	In FY 2007: Continue evaluation of countermeasure techniques to defeat first generation IR imaging missile seekers. Initiate development of second generation IR imaging missile seeker models/simulations for countermeasure technique development. Continue exploitation of advanced IR missiles and IR acquisition sensors for countermeasure technique updates and refinement. Conduct laboratory assessments of active sensing technology to evaluate capabilities against multi-band IR sensors.			
(U)				
(U)	MAJOR THRUST: Develop aerospace missile and laser warning technologies to accurately cue countermeasures.	0.797	1.754	1.845
(U)	In FY 2005: Evaluated advanced multi-color spectral sensor technologies and high spatial resolution imaging for enhanced clutter discrimination techniques for tactical missile warning. Developed an advanced laser warning receiver for airborne pod applications. Developed a space-based laser threat scenario testbed for satellite-as-a-sensor technology evaluations. Developed new laser warning sensor technologies to address ultra-short and tunable laser threats. Developed new laser warning sensor concepts for integration into UAVs and night vision goggles (NVGs).			
(U)	In FY 2006: Complete developing a laser threat scenario testbed for sensor technology evaluations. Continue developing new laser warning sensor technologies to address ultra-short and tunable laser threats. Initiate development of advanced laser warning concepts for aircraft, to include integration into UAVs and NVGs.			
(U)	In FY 2007: Continue developing laser warning sensor concepts for UAVs and NVGs. Continue developing new laser warning sensor technologies to address ultra-short and tunable laser threats. Initiate development of an advanced laser warning concept for integration into tactical aircraft.			
(U)				
(U)	CONGRESSIONAL ADD: Watchkeeper.	1.600	4.140	0.000
(U)	In FY 2005: Developed ultra-wideband RF technology for an unattended ground sensor for perimeter defense.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Watchkeeper.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Super-resolution Sensor System (S3).	2.000	3.253	0.000
(U)	In FY 2005: Developed and tested a high-bandwidth receiver for laser radar through the utilization of many modulated channels and wavelength division.			
(U)	In FY 2006: Conduct Congressionally-directed effort for the Super-resolution Sensor System.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSSIONAL ADD: Optically Pumped Atomic Laser (OPAL).	0.000	0.986	0.000

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

	FY 2005	FY 2006	FY 2007
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Conduct Congressionally-directed effort for OPAL.			
(U) In FY 2007: Not Applicable.			
(U)			
(U) Total Cost	17.639	22.551	16.495

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(U) PE 0603253F, Advanced Sensor Integration.									
(U) PE 0602301E, Intelligence System Program.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2006

BUDGET ACTIVITY: 02 Applied Research

PE NUMBER AND TITLE: 0602204F Aerospace Sensors

PROJECT NUMBER AND TITLE: 44SP Space Sensors

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
44SP Space Sensors	0.000	0.000	8.882	10.615	10.059	10.225	10.380	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2007, efforts will transfer from PE 0602500F, Multi-Disciplinary Space Technology, Project 5028, Space Sensors, Photonics, and RF Processors, and Project 5029, Space Sensor and CM Technology, to this project in order to more effectively manage and provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This project focuses on developing methods of generating, controlling, receiving, transmitting, and processing electronic, photonic, optical, and opto-electronic (mixed) signals for radio frequency (RF) space sensor applications. The enabling technologies will be used for intelligence, surveillance, reconnaissance (ISR), electronic warfare, and precision engagement sensors based in space. This project develops the baseline technologies required to manage and perform on-board space sensor information fusion for timely and comprehensive communications and situational awareness. Through modeling and simulation, this project develops and evaluates innovative electromagnetic and electronic countermeasures for space applications. This project aims to demonstrate significantly improved military space sensors of smaller size, lower weight, lower cost, lower power dissipation, higher reliability, and improved performance. This project also develops and assesses multi-dimensional adaptive techniques in radar technology for affordable and reliable space surveillance and reconnaissance systems.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop hybrid space-based sensor solutions and reduce associated technology risks. Develop algorithms to solve signal processing challenges specific to spaced-based platforms. Note: in FY 2007, space-based sensor platform technology efforts, previously performed under other major thrusts in the Project , were placed here to show greater emphasis.	0.000	0.000	4.340
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Initiate identification and development of specific techniques and technologies to further expand the capabilities of space-based sensor platforms.			
(U)			
(U) MAJOR THRUST: Develop advanced active phased array antenna subsystems to meet the unique requirements of affordable space based sensing including the restrictions on mass, size, power. Utilize advanced materials to demonstrate low-mass, low cost, reliable and scalable apertures. Supports ISR capability.	0.000	0.000	0.692
(U) In FY 2005: Not Applicable.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Demonstrate low-mass scalable tiles/panels with advanced thermal management and improved efficiency for active components.			
(U)			
(U) MAJOR THRUST: Study adaptive processing techniques for large, multi-mission, space-based conformal arrays.	0.000	0.000	2.717

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BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 44SP Space Sensors

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

		FY 2005	FY 2006	FY 2007
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Evaluate adaptive processing techniques suitable for implementation on space-qualified computing architectures for multi-intelligence ISR sensing from space-based platforms. Develop signal processing methods and novel adaptive transmit waveform techniques for a space surveillance platform.			
(U)				
(U)	MAJOR THRUST: Develop advanced photonic component technology for space-based sensors that focuses on improving performance and reducing size, mass, and prime power. Supports ISR capability.	0.000	0.000	1.133
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Develop and model a photonic metrology architecture for large area antennas.			
(U)	Total Cost	0.000	0.000	8.882

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:									
(U) PE 0602500F, Multi-Disciplinary Space Tech.									
(U) PE 0603203F, Advanced Aerospace Sensors.									
(U) PE 0603500F, Multi-Disciplinary Adv Dev Space Tech.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2006

BUDGET ACTIVITY: 02 Applied Research

PE NUMBER AND TITLE: 0602204F Aerospace Sensors

PROJECT NUMBER AND TITLE: 4916 Electromagnetic Tech

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
4916 Electromagnetic Tech	17.608	15.606	14.333	11.838	12.513	13.054	13.680	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This project develops technologies for sensor systems that cover the electromagnetic (EM) spectrum--from radio frequency (RF) to electro-optical (EO). It develops RF antennas and associated electronics for airborne and space-based surveillance. It also investigates RF scattering phenomenology for applications in ground and air moving target indicators in extremely cluttered environments. The project develops active and passive EO sensors for use in concert with RF sensors. It develops low-cost active sensors that use reliable high-performance solid state components for target detection and identification and missile threat warning. The project also develops passive multi-dimensional sensors to improve battlefield awareness and identify threats at long-range.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Investigate detection of difficult airborne and ground-based targets in clutter from airborne or space-based surveillance platforms.	2.581	2.620	3.583
(U) In FY 2005: Developed and validated target and clutter models and innovative measurement techniques for the parametric description of radar signal scattering from targets, terrain, and foliage.			
(U) In FY 2006: Develop integration techniques for combining EM target and clutter physics models with signal processing for improved target detection.			
(U) In FY 2007: Develop integration techniques for multiple platforms, combining EM target and clutter physics models with signal processing for improved target detection.			
(U)			
(U) MAJOR THRUST: Design and develop antennas for airborne and space-based surveillance.	2.625	2.789	3.815
(U) In FY 2005: Designed and analyzed advanced large lightweight array antennas. Fabricated breadboard for large lightweight array antennas. Developed new algorithms for multi-beam digital beam forming and limited-scan phased array antennas. Validated high-speed electronics antenna front-end applications and micro-electro-mechanical systems (MEMS) technology for delay line switching in phased arrays.			
(U) In FY 2006: Develop and demonstrate novel RF and digital hardware architectures and embedded algorithms that achieve wideband digital beamforming for multi-function phased arrays. Analyze and develop advanced 3-D MEMS RF structures that improve RF circuit design flexibility and reduce the size and cost of microwave integrated circuits. Investigate and develop novel designs for rugged, wideband, low-profile conformal antennas for airborne applications.			
(U) In FY 2007: Develop nonlinear embedded algorithms that enhance dynamic range and bandwidth of digital beamforming hardware, enabling the use of lower cost hardware. Demonstrate the integration of microwave integrated circuits into low-cost 3-D MEMS RF structures designed for a miniature seeker radar. Analyze and			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 4916 Electromagnetic Tech

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	develop digital beamforming architectures for conformal phased array antennas for future air-to-air radar system applications.			
(U)				
(U)	MAJOR THRUST: Design and develop new EO techniques and components for detecting and identifying concealed targets.	2.301	2.282	3.121
(U)	In FY 2005: Evaluated multi-function, multi-sensor optical arrays and the associated materials and device technologies for optical beam steering. Evaluated active components and integration techniques for autonomous 3-D laser radar (LADAR) guided munitions and other imaging applications. Evaluated optical processing techniques that compensate for optical aberration in aircraft-generated turbulence.			
(U)	In FY 2006: Test newly developed avalanche photo diodes (APD) integrated with electronic readout circuits. Integrate subcomponents with flash LADAR system and perform live tests to evaluate guidance and range resolution capability. Test and evaluate next generation APD designs and incorporate in 3-D LADAR test-bed. Continue development of quasi-phased matched materials for laser wavelength conversion applications.			
(U)	In FY 2007: Develop Zinc Oxide (ZnO), Aluminum Nitride (AlN) and Gallium Nitride (GaN) semiconductors for high power, high temperature EO applications. Develop single crystal GaN substrates for use in detection of biological agents in clouds and in harsh battlefield environments. Use developed LADAR techniques to extend range of agent and target detection. Develop ZnO, GaN, and AlN-based APDs for increased range and detection sensitivity and for non-line-of-sight covert communications.			
(U)				
(U)	MAJOR THRUST: Develop hardware and software for passive multi-dimensional sensing in the thermal infrared spectral wavelength range at high frame rates.	2.301	2.788	3.814
(U)	In FY 2005: Developed technology for a new dual band tomographically-based sensor system for characterizing energetic battlefield events in real-time. Developed techniques that use hyperspectral, simultaneous dual-band information to increase the validity of target declaration and to reduce false alarms.			
(U)	In FY 2006: Design dual band tomographically based sensor system utilizing Cross Dispersion Prism (CDP) to characterize energetic battlefield events in real-time. Create CDP prototype and begin in-house calibration and performance evaluation. Refine CDP techniques used to validate target declaration and reduce false alarms. Design and develop micro-lens multi-spectral sensor for real-time threat warning and battle damage assessment.			
(U)	In FY 2007: Continue evaluation of CDP-based sensor system performance. Expand evaluation of CDP-based sensor system to field testing of various assets of interest and integration of CDP for target validation and reduction of false alarms. Continue design and development of micro-lens multi-spectral sensor for real-time threat warning and battle damage assessment. Evaluate micro-lens multi-spectral sensor performance for real-time threat warning			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 4916 Electromagnetic Tech

(U)	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	and battle damage assessment.			
(U)				
(U)	CONGRESSIONAL ADD: Center for Advanced Sensor and Communications Antennas.	3.000	1.183	0.000
(U)	In FY 2005: Developed innovative, low-cost designs and fabrication methods to achieve high performance and proliferation of advanced phased array antennas into new military applications.			
(U)	In FY 2006: Conduct Congressionally-directed effort for the Center for Advanced Sensor and Communications Antennas.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Phased Array Antenna Control Computer.	1.300	0.986	0.000
(U)	In FY 2005: Developed control system for a 12-meter diameter dome phased array antenna. Developed beam resource management of multiple simultaneous active receive and transmit apertures on the dome surface. Developed tracking algorithms for large apertures including various approaches to track the fluctuating signals from unstable beams. Developed techniques for remote dome management allowing a remote control center to configure beams and allocate them to individual users. Developed approaches for handling dome health and status information so maintenance requirements can be collected at a remote central site.			
(U)	In FY 2006: Conduct Congressionally-directed effort for the Phased Array Antenna Control Computer.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Optical Maximum Entropy Verification (OMEV). Note: In FY 2005, this Add was titled Optical Signature Recognition for Authenticity Verification.	1.000	0.986	0.000
(U)	In FY 2005: Developed a unique optical signature recognition system for authenticity verification of Department of Defense identification cards and other documents.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Optical Maximum Entropy Verification.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Compact Ultra-Sensitive Optical Receiver for Smart and Loitering Standoff Weapons.	1.000	0.986	0.000
(U)	In FY 2005: Developed a small footprint, ultra-sensitive, eye-safe optical receiver.			
(U)	In FY 2006: Conduct Congressionally-directed effort for a Compact Ultra-Sensitive Optical Receiver for Smart and Loitering Standoff Weapons.			
(U)	In FY 2007: Not Applicable.			
(U)				

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 4916 Electromagnetic Tech

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	CONGRESSIONAL ADD: Stable Articulating Backbone for Ultralight Radar (SABUR).	1.500	0.986	0.000
(U)	In FY 2005: Developed the mechanical deployment structure for SABUR. Designed the radar truss and the metrology and signal processing needed to maintain coherence and pointing accuracy. Built large-scale working prototypes of the concept.			
(U)	In FY 2006: Conduct Congressionally-directed effort for SABUR.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	17.608	15.606	14.333

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(U) PE 0602702F, Command Control and Communications.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT NUMBER AND TITLE
02 Applied Research	0602204F Aerospace Sensors	5016 Photonic Component Technology

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
5016 Photonic Component Technology	2.869	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2006, efforts in this project will transfer to Project 2002 within this PE in order to more effectively manage an provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This project focuses on designing and developing methods to generate, control, receive, transmit, and process opto-electronic (mixed) signals for radio frequency (RF) sensor aerospace applications. Enabling technologies developed under this project for intelligence, surveillance, reconnaissance (ISR) electronic warfare (EW) and precision engagement sensors include: low noise, aerospace environmentally-qualified signal control components (e.g., electro-optical (EO) switches, micro-opto-electronic mixed signals); EO components for RF links; photonic signal control, distribution, and signal processing; multi-function, aerospace-qualified, opto-electronic intraconnects and interconnects. This project designs, develops, fabricates, and evaluates techniques for integrating various combinations of photonic and electronic technologies. The main purpose is to demonstrate significantly improved military sensors of smaller size, lower weight, lower cost, lower prime power, higher reliability, and improved performance -- as compared to current systems. The device, component, and subsystem technology developments under this project are military unique and based on Air Force and other Department of Defense weapon systems requirements in the areas of radar, sensors, communications, EW, navigation, and smart weapons.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop integrated photonic technology components.	2.869	0.000	0.000
(U) In FY 2005: Laboratory tested and validated high-performance integrated photonic technology link, interconnect, and switching components and subsystems for wideband RF phased array antenna beamforming and control, and for high data rate aerospace sensors and communication systems.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Not Applicable.			
(U) Total Cost	2.869	0.000	0.000

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(U) PE 0603203F, Advanced Aerospace Sensors.									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602204F Aerospace Sensors**	PROJECT NUMBER AND TITLE **5016 Photonic Component Technology**

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

(U) PE 0603270F, Electronic Combat Technology.

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2006

BUDGET ACTIVITY: 02 Applied Research

PE NUMBER AND TITLE: 0602204F Aerospace Sensors

PROJECT NUMBER AND TITLE: 5017 RF Processing for ISR Sensors

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
5017 RF Processing for ISR Sensors	7.482	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2006, efforts in this project will transfer to Project 7622 within this PE in order to more effectively manage an provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This project develops and assesses radar technology for affordable, reliable, all weather aerospace intelligence, surveillance, reconnaissance (ISR) systems. Emphasis is on detecting and tracking surface and airborne targets that have difficult to detect signatures due to reduced cross sections, concealment and camouflage measures, severe clutter, or heavy jamming. Techniques exploited include the use of multiple radio frequency (RF) phenomenologies, multi-dimensional adaptive processing, advanced waveforms, and knowledge-aided processing techniques.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop distributed airborne sensor systems to increase sensitivity and improve location accuracy.	0.413	0.000	0.000
(U) In FY 2005: Demonstrated in the laboratory the proof of concept of RF processing techniques for implementing distributed airborne sensing techniques for detecting, locating, and engaging airborne and ground targets.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Not Applicable.			
(U)			
(U) MAJOR THRUST: Investigate techniques for multi-intelligence data acquisition from a single platform.	2.257	0.000	0.000
(U) In FY 2005: Validated multi-function radar sensing through computer simulations and emulations. Laboratory tested RF processing techniques to minimize the electromagnetic compatibility issues associated with hosting multiple radars, electronic support measure receivers, integrated communications equipment, and electronic attack components on a single platform capable of operating simultaneously. Evaluated methods to mitigate unintentional interferers on the ground and in the air such as commercial broadcast assets, civilian radar assets, and commercial communications systems on multi-intelligence platforms. Developed electronic counter-countermeasure (ECCM) techniques that will enable maintaining a surveillance capability in various advanced jamming scenarios based upon multi-intelligence single platform sensing. Researched advanced ECCM techniques to enable maintaining a surveillance capability in various advanced jamming scenarios based upon multi-intelligence single platform sensing.			
(U) In FY 2006: Not Applicable.			
(U) In FY 2007: Not Applicable.			
(U)			
(U) MAJOR THRUST: Develop multi-mission aerospace microwave processing algorithms to detect and locate advanced cruise missiles, slowly moving ground targets, and stationary targets in severe clutter and jamming	1.930	0.000	0.000

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 5017 RF Processing for ISR Sensors

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	environments.			
(U)	In FY 2005: Evaluated multi-mission adaptive radar algorithms to support various operational modes including air and ground target detection, ground target imaging, and electronic protection. Developed advanced waveforms for achieving transmit adaptivity and simultaneous multi-mode operation to improve interference rejection, self-protection, and target identification by exploiting diversity in frequency, delay, polarization, and modulation and coding. Laboratory tested knowledge-aided radar signal processing techniques for improved detection and false alarm control performance in multi-intelligence sensors.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	MAJOR THRUST: Study and analyze technology for detecting and precisely locating concealed targets using stand off aerospace platforms.	2.247	0.000	0.000
(U)	In FY 2005: Evaluated emerging adaptive processing techniques for knowledge-aided, multi-mission processing and resource management. Developed adaptive processing techniques for multi-mission conformal arrays. Developed and evaluated wideband and polarization adaptive processing techniques for multi-function radar. Investigated distributed processing technology for next generation deep-reach target detection and tracking.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	MAJOR THRUST: Develop wideband integrated photonic components.	0.359	0.000	0.000
(U)	In FY 2005: Developed high-performance, low loss, wideband integrated photonic link, interconnect, and switching components and subsystems for all weather space and airborne surveillance and reconnaissance systems. This work was an outgrowth of other work in this project.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	MAJOR THRUST: Develop wideband photonic analog-to-digital mixed signal conversion component technologies.	0.276	0.000	0.000
(U)	In FY 2005: Developed high-resolution, ultra-fast, multi-gigahertz wideband photonic analog-to-digital mixed signal conversion component technology for all weather space and airborne surveillance and reconnaissance systems. This work was an outgrowth of other work in this project.			
(U)	In FY 2006: Not Applicable.			
(U)	In FY 2007: Not Applicable.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 5017 RF Processing for ISR Sensors

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

	FY 2005	FY 2006	FY 2007
(U) Total Cost	7.482	0.000	0.000

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(U) PE 0603203F, Advanced Aerospace Sensors.									
(U) PE 0603270F, Electronic Combat Technology.									

(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2006

BUDGET ACTIVITY: 02 Applied Research

PE NUMBER AND TITLE: 0602204F Aerospace Sensors

PROJECT NUMBER AND TITLE: 6095 Sensor Fusion Technology

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
6095 Sensor Fusion Technology	13.019	17.061	17.548	15.978	16.405	16.618	16.838	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

(U) A. Mission Description and Budget Item Justification

This project develops the technologies required to perform management and fusion of sensor information for timely, comprehensive situational awareness, automated target recognition (ATR), integrated fire control, and bomb damage assessment. This project determines the feasibility of technologies and concepts for fire control that help to precisely locate, identify, and target airborne and surface targets. The project emphasizes finding reduced signature targets and targets of opportunity. It will enable new covert tactics for successful air-to-air and air-to-surface strikes.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop and assess single and multi-sensor ATR and sensor fusion algorithms for rapidly finding, tracking, and targeting mobile targets.	1.587	2.771	2.905

(U) In FY 2005: Developed improvement in image formation and processing of Synthetic Aperture Radar (SAR) data from Research and Development (R&D) data collections. Developed automated image analysis and truthing tools. Employed synthetic data generation tools to augment and enhance existing R&D and operational data sets. Improved ATR R&D computer and networking infrastructure via software, hardware, and network integration enhancements. Assessed the effectiveness of real-time ATR algorithms for time-critical targets on embedded high-performance computing systems. Laboratory tested multi-sensor and sensor fusion assessment algorithms. Researched ATR performance evaluation theory. Laboratory tested the first multi-sensor ATR performance prediction model.

(U) In FY 2006: Continue to develop improvement in image formation and processing of SAR data from R&D data collections. Complete automated image analysis and truthing tools. Continue development of synthetic data generation tools to augment and enhance collected R&D and operational data sets. Complete initial ATR R&D computer and networking infrastructure via software, hardware, and network integration enhancements. Complete assessing the effectiveness of real-time ATR algorithms for time-critical targets on embedded high-performance computing systems. Continue laboratory tests and assessment of multi-sensor and sensor fusion algorithms for automated exploitation and weapon delivery systems. Continue ATR performance evaluation theory research for radar, electro-optical (EO), and multiple sensor ATR technologies. Laboratory test the first multi-sensor ATR performance prediction model. Initiate assessment methods and measures for moving target tracking and identification (ID) approaches using multiple sensor types. Initiate development of analysis methods and measures for assessing automated exploitation and rapid response systems proposed for post-conflict force protection, stability, and security operations.

(U) In FY 2007: Continue to develop improvement in image formation and processing of SAR data from R&D data collections. Continue development of synthetic data generation tools to augment and enhance collected R&D and

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 6095 Sensor Fusion Technology

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	operational data sets. Continue laboratory tests and assessment of multi-sensor and sensor fusion algorithms for automated exploitation and weapon delivery systems. Complete initial ATR performance evaluation theory for radar ATR technology and continue for EO and multiple sensor ATR technologies. Laboratory test the first multi-sensor ATR performance prediction model. Continue assessment methods and measures for moving target tracking and ID approaches using multiple sensor types. Continue development of analysis methods and measures for assessing automated exploitation and rapid response systems proposed for post-conflict force protection, stability, and security operations.			
(U)				
(U)	MAJOR THRUST: Develop, evaluate, and demonstrate target signature models to support ATR and sensor fusion algorithm development and testing for reconnaissance and strike mission applications.	6.318	5.362	4.884
(U)	In FY 2005: Evaluated target signature models for signature exploitation of radio frequency (RF) sensors, EO multi-spectral systems, and signals intelligence sensors. Generated synthetic air and ground target signatures with sufficient fidelity to support automatic recognition of targets in operationally realistic mission environments. Evaluated preliminary two-class ATR for EO sensed vibration of tactical ground targets. Developed a synthetic scene data generation capability applicable to large area reconnaissance coverage. Upgraded fidelity of modeling and simulation tools that estimate warfighter effectiveness enhancements enabled by inserting ATR and sensor fusion aids to the reconnaissance and strike components of the time-critical targeting kill chain.			
(U)	In FY 2006: Continue to mature target signature models for signature exploitation of RF sensors, EO multi-spectral systems, and signals intelligence (SIGINT) sensors. Continue to develop, signatures, algorithms, and modeling support for RF and multiple EO phenomenology ATR of tactical ground targets. Continue to generate synthetic air and ground target signatures with sufficient fidelity to support automatic recognition of targets in operationally realistic mission environments. Continue developing a synthetic scene data generation capability for RF scenes applicable to large area reconnaissance coverage. Initiate investigation of model-driven spectral signal processing and exploitation techniques. Initiate development of ATR algorithm-driven RF sensor design, new modes of operation for existing sensors, and signal processing/exploitation for high diversity data.			
(U)	In FY 2007: Continue to mature target signature models for signature exploitation of RF sensors, EO multi-spectral systems, and SIGINT sensors. Continue to develop signatures, algorithms, and modeling support for multiple RF and EO phenomenology ATR of tactical ground targets. Continue to generate synthetic air and ground target signatures with sufficient fidelity to support ATR of targets in operationally realistic mission environments. Demonstrate a synthetic scene data generation capability for RF scenes and begin development of an EO scene capability applicable to large area reconnaissance coverage. Continue investigation of model-driven spectral signal processing and exploitation techniques. Continue development of ATR algorithm-driven RF sensor design, new			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 6095 Sensor Fusion Technology

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	modes of operation for existing sensors, and signal processing/exploitation for high diversity data.			
(U)				
(U)	MAJOR THRUST: Develop and demonstrate enabling ATR, sensor management, and sensor fusion technologies for target detection, tracking, and identification in intelligence, surveillance, reconnaissance (ISR) and combat identification (CID) applications.	5.114	7.942	9.759
(U)	In FY 2005: Developed exploitable radar features for target detection, tracking, and identification. Conducted laboratory demonstration of advanced algorithms for detection and identification of targets under trees and/or in the presence of heavy camouflage, concealment, and deception. Developed technology that will capitalize on precision time, position, attitude, and velocity sensor data to enable improved geo-location capabilities for future distributed time and distributed platform sensing. Developed capabilities to represent and utilize sensor parameters and errors, along with other uncertainty reference information, for improved fused geo-location accuracy.			
(U)	In FY 2006: Begin fusion of exploitable radar, EO/infrared (IR), laser radar (LADAR), and hyperspectral features for target detection, tracking, and ID with sensor management techniques. Continue evaluation of physics-based techniques for target detection and identification for ISR and CID applications. Transition to advanced development programs laboratory demonstrated advanced algorithms for detection and identification of targets under trees and/or in the presence of heavy camouflage, concealment, and deception. Continue development of technology that will capitalize on precision time, position, attitude, and velocity sensor data to enable improved geo-location capabilities for future distributed time and distributed platform sensing. Continue development of capabilities to represent and utilize sensor parameters and errors, along with other uncertainty reference information, for improved fused geo-location accuracy. Initiate research of bio-inspired ATR for robustness. Begin ATR, sensor management, and sensor fusion research for urban ISR from small unmanned aerial vehicles (UAVs).			
(U)	In FY 2007: Continue fusion of exploitable radar, EO/IR, LADAR, and hyperspectral features for target detection, tracking, and ID with sensor management techniques. Continue evaluation of physics-based techniques for target detection and ID for ISR and CID applications. Continue development of technology that will capitalize on precision time, position, attitude, and velocity sensor data to enable improved geo-location capabilities for future distributed time and distributed platform sensing. Begin investigation of pixel level registration techniques. Continue development of capabilities to represent and utilize sensor parameters and errors, along with other uncertainty reference information, for improved fused geo-location accuracy. Continue research of bio-inspired ATR for robustness. Continue ATR, sensor management, and sensor fusion research for urban ISR from small UAVs			
(U)				
(U)	CONGRESSIONAL ADD: Advanced Sensor-based Vigilance Technologies.	0.000	0.986	0.000
(U)	In FY 2005: Not Applicable.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 6095 Sensor Fusion Technology

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

		FY 2005	FY 2006	FY 2007
(U)	In FY 2006: Conduct Congressionally-directed effort for Advanced Sensor-based Vigilance Technologies.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	Total Cost	13.019	17.061	17.548

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(U) PE 0603203F, Advanced Aerospace Sensors.									
(U) PE 0602602F, Conventional Munitions.									
(U) PE 0603270F, Electronic Combat Technology.									
(U) PE 0603226E, Experimental Evaluation of Major Innovative Technologies.									
(U) PE 0603762E, Sensor and Guidance Technology.									
(U) This project has been coordinated through the Reliance process to harmonize efforts and eliminate duplication.									

(U) D. Acquisition Strategy

Not Applicable.

Exhibit R-2a, RDT&E Project Justification

DATE: February 2006

BUDGET ACTIVITY: 02 Applied Research

PE NUMBER AND TITLE: 0602204F Aerospace Sensors

PROJECT NUMBER AND TITLE: 7622 RF Sensors & Countermeasures Tech

Cost ($ in Millions)	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total
7622 RF Sensors & Countermeasures Tech	15.494	37.519	33.385	28.000	29.667	29.995	30.760	Continuing	TBD
Quantity of RDT&E Articles	0	0	0	0	0	0	0		

Note: In FY 2006 efforts in Project 5017 will transfer to this project in order to more effectively manage an provide oversight of the efforts.

(U) A. Mission Description and Budget Item Justification

This project develops and assesses affordable, reliable all weather radio frequency (RF) sensing concepts for aerospace applications covering the range of radar sensors including intelligence, surveillance, reconnaissance (ISR) and fire control, both active and passive. This project also develops and evaluates technology for ISR, fire control radar, electronic combat (EC), and integrated radar and EC systems. It emphasizes the detecting and tracking of surface and airborne targets with RF signatures that are difficult to detect due to reduced radar cross sections, concealment and camouflage measures, severe clutter, or heavy jamming. Techniques exploited include the use of multiple RF phenomenologies, multi-dimensional adaptive processing, advanced waveforms, and knowledge-aided processing techniques. This project also develops the RF warning and countermeasure technology for advanced EC applications. Specifically, it develops techniques and technologies to detect and counter the links and sensors of threat air defense systems and hostile command and control networks. The project also exploits emerging technologies and components to provide increased capability for offensive and defensive RF sensors, including radar warning, RF EC, and electronic intelligence applications.

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U) MAJOR THRUST: Develop affordable RF jamming technology and concepts that enhance aerospace vehicle survivability by degrading enemy radar, missile, and command and control systems. Note: Effort completes in FY 2006.	3.944	1.767	0.000
(U) In FY 2005: Developed a complex signal communication environment simulator that contains both adversary and friendly advanced spread spectrum signals. Developed technology for an advanced digital communications jammer. Conducted exploitation evaluations against new, advanced RF threats. Evaluated results of a laboratory demonstration of phase calibration system for a monopulse countermeasure technique to protect all Air Force platforms.			
(U) In FY 2006: Complete development and test of a complex signal communication environment simulator that contains both adversary and friendly advanced spread spectrum signals. Complete development and test of technology for an advanced digital communications jammer. Complete exploitation evaluations against new, advanced RF threats. Perform exploratory research into development of networked electronic attack techniques.			
(U) In FY 2007: Not Applicable.			
(U)			
(U) MAJOR THRUST: Develop advanced waveforms for achieving transmit adaptivity and simultaneous multi-mode operation to improve interference rejection, self-protection, and target identification by exploiting diversity in frequency, delay, polarization, and modulation and coding. Develop technologies and techniques to provide	1.224	5.530	17.835

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 7622 RF Sensors & Countermeasures Tech

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
	significant size, weight, and power (SWaP) reductions in RF sensors compatible with severely constrained unmanned air platforms. Develop technology to enable affordable upgrades to RF signal receivers.			
(U)	In FY 2005: Validated threat identification algorithms for next generation threat warning receivers. Developed affordable wideband RF cueing receiver technology. Evaluated the impact of mixed-signal (digital, RF, microwave, etc.) and mixed-technology (electronics, micro-electro-mechanical, photonics, etc.) component development using advanced and emerging technologies for digital receiver and exciter systems.			
(U)	In FY 2006: Identify and analyze advanced receiver/exciter techniques for operation with temporally and spatially adaptive electronic support (ES) and radar antenna systems. Identify and analyze advanced digital signal processing techniques that support distributed and adaptive ES and radar receiver/exciter sensor systems. Minimize SWaP for advanced apertures and receivers, waveform diversity, assured reference, and machine-to-machine sensor cross cueing. Investigate innovative techniques to provide concurrent RF radar and electronic warfare (EW) with electro-optical (EO) compatibility on a single platform. Develop integrated radar and EW modeling, simulation, and analysis capabilities to address system-level multi-intelligence trades.			
(U)	In FY 2007: Develop and evaluate advanced digital receiver/exciter technologies for ES and radar applications that support multiple degree-of-freedom adaptivity. Develop and evaluate advanced signal processing concepts that seamlessly integrate with receiver technologies to support increased levels of adaptivity for operation in complex signal environments. Continue development to reduce size, weight, and power in RF sensors compatible with severely constrained unmanned air platforms. Refine innovative techniques to provide concurrent RF radar and EW with EO compatibility on a single platform. Determine system-level multi-intelligence trades through integrated radar and EW modeling, simulation, and analysis.			
(U)				
(U)	MAJOR THRUST: Develop robust, ultra-widebandwidth antenna technology for use in operational and future aerospace platform electronic apertures. Develop innovative technologies and architectures for extremely wideband apertures to provide for more functionality on a set of platforms. Research next generation applied RF aperture technology.	2.018	6.376	3.818
(U)	In FY 2005: Developed and laboratory demonstrated advanced wideband transmit/receive channel technology. Evaluated design tools to predict antenna performance installed on host platform models. Laboratory demonstrated techniques that provide low-cost, lightweight phased arrays for low band applications.			
(U)	In FY 2006: Design and model thin profile, wideband arrays for ES receive applications. Design and fabricate array beam steering capability for wideband array jammer transmitter. Design and model compact, wideband direction finding antenna. Extend bandwidth performance of unique, low profile, low-cost antenna element.			
(U)	In FY 2007: Fabricate and test thin profile, wideband receive array. Extend array to accommodate transmit function.			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 7622 RF Sensors & Countermeasures Tech

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	Evaluate performance of directional wideband array transmitter. Fabricate and test compact, wideband direction finding antenna for close in sensing.			
(U)				
(U)	MAJOR THRUST: Develop multi-function RF sensing concepts and RF transformational element level arrays for concurrent multi-mode operation.	4.521	2.207	2.287
(U)	In FY 2005: Modeled and simulated innovative multi-function RF sensing concepts for air and space applications. Developed and evaluated advanced multi-function and multi-intelligence RF sensors for ISR and targeting of time-critical targets with applications in unmanned aerial vehicles and manned aircraft. Planned testbed and designed experiment to support validation of concepts and the subsystem requirements for advanced multi-intelligence sensors.			
(U)	In FY 2006: Fabricate and laboratory test low-cost millimeter wave sensor that provides height indication in addition to azimuth and range for landing in obscured environments. Design distributed position, navigation, and time (PNT) virtual testbed to assess assured reference techniques that achieve optimal multi-function RF sensor fusion for a Common Operation Picture (COP). Extend array simulations to determine technology shortfalls for full element level digital beam forming (DBF).			
(U)	In FY 2007: Develop distributed PNT virtual testbed to assess assured reference techniques that achieve optimal multi-function RF sensor fusion for a COP. Perform systems engineering analysis of concurrent operation to determine multi-mode array performance. Initiate technology development of critical subsystems for element level multi-mode DBF.			
(U)				
(U)	MAJOR THRUST: Develop digital RF receiver/exciter technology to support DBF.	1.982	6.325	1.625
(U)	In FY 2005: Developed and evaluated DBF-specific receiver/exciter technologies that stress reduced size, weight, and power consumption, affordability using advanced digital technologies, RF packaging, and functional integration of the RF receiver, analog-to-digital conversion, digital channelization, and digital time delay beamsteering subsystems. Performed testbed integration of multi-intelligence RF receiver/exciter, aperture, and signal processing subsystems.			
(U)	In FY 2006: Develop and model DBF-specific receiver/exciter technologies that stress reduced size, weight, and power consumption, as well as increased affordability for ES and radar sensor systems. Demonstrate through simulation and laboratory integration the benefits for DBF receiver/exciter technologies for multi-intelligence RF sensor systems.			
(U)	In FY 2007: Demonstrate receiver/exciter technologies that support DBF functionality for advanced electronic support and radar sensor systems. Perform laboratory integration and demonstration of reduced size, weight and			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 7622 RF Sensors & Countermeasures Tech

(U) B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
power consumption receiver/exciter technologies that support multi-function RF sensor concepts.			
(U)			
(U) MAJOR THRUST: Design exploratory outdoor time transfer experiments between multiple moving platforms for enhanced situational awareness. Investigate techniques for multi-intelligence data acquisition from a single platform.	1.155	0.956	1.233
(U) In FY 2005: Developed experiments in assured reference to evaluate advanced navigation technologies for network centric warfare applications.			
(U) In FY 2006: Demonstrate critical experiments in innovative time transfer techniques for network centric warfare applications. Develop engineering tools to implement advanced electronic counter-countermeasure (ECCM) techniques. Validate the engineering tools using both synthetic and field collected data.			
(U) In FY 2007: Develop ECCM techniques capable of defeating advanced and evolving threats to long-range ISR platforms. Implement developed techniques through previously developed tools. Develop concept for validation of multi-intelligence sensor technologies.			
(U)			
(U) MAJOR THRUST: Develop advanced waveforms for achieving transmit adaptivity and simultaneous multi-mode operation to improve interference rejection, self-protection, and target identification by exploiting diversity in frequency, delay, polarization, and modulation and coding. Develop multi-platform, multi-mission radar adaptive processing algorithms that improve detection and location performance for advanced cruise missiles, air- and ground-based targets in severe clutter and jamming environments.	0.650	7.064	6.587
(U) In FY 2005: Developed adaptive processing techniques for multi-mission conformal arrays.			
(U) In FY 2006: Evaluate advanced adaptive transmit waveforms for single- and multi-mode operation to improve interference rejection, self-protection, target identification, and ambiguity resolution using temporal, spatial, frequency, and polarization diversity. Initiate optimization of waveforms for multi-sensor, multi-mode operations for moving target indicator (MTI) surveillance platforms. Initiate development of advanced radar signal processing algorithms for multi-sensor, multi-mode operation. Continue to develop wideband and polarization adaptive processing techniques for multi-function radar. Evaluate adaptive processing techniques for multi-mission conformal arrays. Develop distributed processing technology for next generation deep-reach target detection and tracking.			
(U) In FY 2007: Develop optimal waveforms for multi-sensor/multi-mode radar. Develop advanced radar signal processing algorithms that are suitable for multi-sensor, multi-mode operation. Evaluate wideband radar signal processing techniques for MTI surveillance platforms. Evaluate distributed processing technology for next generation deep-reach target detection and tracking.			
(U)			

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY 02 Applied Research	PE NUMBER AND TITLE 0602204F Aerospace Sensors	PROJECT NUMBER AND TITLE 7622 RF Sensors & Countermeasures Tech

	B. Accomplishments/Planned Program ($ in Millions)	FY 2005	FY 2006	FY 2007
(U)	CONGRESSIONAL ADD: Minority LEADERS Research Program.	0.000	1.774	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for the Minority LEADERS Research Program.			
(U)	In FY 2007: Not Applicable.			
(U)				
(U)	CONGRESSIONAL ADD: Small Disadvantaged Business, Historically Black Colleges and Universities.	0.000	5.520	0.000
(U)	In FY 2005: Not Applicable.			
(U)	In FY 2006: Conduct Congressionally-directed effort for Small Disadvantaged Business, Historically Black Colleges and Universities.			
(U)	In FY 2007: Not Applicable.			
(U)	Total Cost	15.494	37.519	33.385

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

	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	Cost to Complete	Total Cost
(U) Related Activities:									
(U) PE 0602500F, Multi-Disciplinary Space Technology.									
(U) PE 0603203F, Advanced Aerospace Sensors.									
(U) PE 0603253F, Advanced Avionics Integration.									
(U) PE 0602782A, Command, Control, Communications Technology.									
(U) PE 0602232N, Navy C3 Technology.									
(U) PE 0603792N, Advanced Technology Transition.									
(U) This project has been coordinated through the Reliance									

Exhibit R-2a, RDT&E Project Justification		DATE February 2006
BUDGET ACTIVITY **02 Applied Research**	PE NUMBER AND TITLE **0602204F Aerospace Sensors**	PROJECT NUMBER AND TITLE **7622 RF Sensors & Countermeasures Tech**

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

process to harmonize efforts and eliminate duplication.

(U) D. Acquisition Strategy

Not Applicable.