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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Air Force									DATE: February 2010		
APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)				R-1 ITEM NOMENCLATURE PE 0603270F: Electronic Combat Technology							
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	29.364	32.056	16.992	0.000	16.992	22.636	23.719	24.367	24.018	Continuing	Continuing
632432: Defensive System Fusion Technology	11.622	4.543	4.707	0.000	4.707	6.292	6.358	6.142	5.926	Continuing	Continuing
63431G: RF Warning & Countermeasures Tech	9.609	21.250	4.142	0.000	4.142	5.502	6.854	7.190	7.028	Continuing	Continuing
63691X: EO/IR Warning & Countermeasures Tech	8.133	6.263	8.143	0.000	8.143	10.842	10.507	11.035	11.064	Continuing	Continuing
A. Mission Description and Budget Item Justification This program develops and demonstrates technologies to support Air Force electronic combat warfighting capabilities. The program focuses on developing components, subsystems, and technologies with potential aerospace combat, special operations, and airlift electronic combat applications in three project areas. The first project develops and demonstrates technologies for integrating electronic combat sensors and systems into a fused and seamless whole. The second project develops and demonstrates advanced technologies for radio-frequency electronic combat suites. The third project develops and demonstrates advanced warning and countermeasure technologies to defeat electro-optical, infrared, and laser threats to aerospace platforms. 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.											

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APPROPRIATION/BUDGET ACTIVITY		R-1 ITEM NOMENCLATURE			
3600: Research, Development, Test & Evaluation, Air Force		PE 0603270F: Electronic Combat Technology			
BA 3: Advanced Technology Development (ATD)					
B. Program Change Summary (\$ in Millions)					
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	30.241	31.021	0.000	0.000	0.000
Current President's Budget	29.364	32.056	16.992	0.000	16.992
Total Adjustments	-0.877	1.035	16.992	0.000	16.992
• Congressional General Reductions		-0.031			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.134			
• Congressional Adds		1.200			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	0.000	0.000			
• Other Adjustments	-0.877	0.000	16.992	0.000	16.992
Congressional Add Details (\$ in Millions, and Includes General Reductions)					
Project: 632432: Defensive System Fusion Technology				FY 2009	FY 2010
Congressional Add: Advanced Threat Alert Advanced Technology Demonstration.				4.867	0.000
Congressional Add: Commercial-Off-the-Shelf (COTS) Analysis Tools for Navigational Warfare.				1.197	0.000
Congressional Add Subtotals for Project: 632432				6.064	0.000
Project: 63431G: RF Warning & Countermeasures Tech					
Congressional Add: Advanced Electromagnetic Location of IEDs Defeat System.				1.596	1.195
Congressional Add: New Electronic Warfare Specialists Through Advanced Research by Students.				1.596	0.000
Congressional Add Subtotals for Project: 63431G				3.192	1.195
Congressional Add Totals for all Projects				9.256	1.195

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<p><u>Change Summary Explanation</u></p> <p>Note: In FY 2010, Congress added \$1.2 million for Advanced Electromagnetic Location of IEDs Defeat System. The FY 2010 President's Budget submittal did not reflect FY 2011 through FY 2015 funding. A detailed explanation of changes between the two budget positions is not provided because it cannot be made in a relevant manner.</p> <p>C. Performance Metrics Under Development.</p>		

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Exhibit R-2A, RDT&E Project Justification: PB 2011 Air Force								DATE: February 2010			
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603270F: <i>Electronic Combat Technology</i>				PROJECT 632432: <i>Defensive System Fusion Technology</i>			
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
632432: <i>Defensive System Fusion Technology</i>	11.622	4.543	4.707	0.000	4.707	6.292	6.358	6.142	5.926	Continuing	Continuing
A. Mission Description and Budget Item Justification This project develops and demonstrates technologies for integrating electronic combat sensors and electronic combat system fusion. It develops advanced algorithms and assessment techniques needed to evaluate and enable combat aircraft operations in multi-spectral threat and countermeasure environments. It also matures technologies required for command-and-control warfare, standoff jamming, and electronic support measures for the denial, disruption, and suppression of adversary air defense operations. Technologies include: advanced components and techniques needed to jam enemy radars; advanced standoff jammer technologies; and electronic collection methods to inform field commanders of changes in the electronic environment.											
B. Accomplishments/Planned Program (\$ in Millions)											
						FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	
MAJOR THRUST: Develop affordable radio-frequency and electro-optical emitter warning and electronic warfare battle (EW) management technologies, integrating EW and information operations.						5.558	4.543	4.707	0.000	4.707	
FY 2009 Accomplishments: In FY 2009: Conducted analyses and initial demonstrations of electronic warfare battle management strategies in the Air Force Integrated Demonstrations and Applications Laboratory and Virtual Combat Laboratory simulation facilities. Developed and demonstrated technical protocols for the integration of electronic warfare, command-and-control warfare, and information operations against an integrated air defense system. Developed and matured key technologies essential for Airborne Electronic Attack risk reduction.											
FY 2010 Plans: In FY 2010: Continue research into electronic warfare battle management techniques and protocols in the Virtual Combat Environment for Electronic Conflict. Investigate and demonstrate electronic attack techniques from multiple nodes. Initiate a project to demonstrate a distributed (multi-node) electronic											

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APPROPRIATION/BUDGET ACTIVITY 3600: Research, Development, Test & Evaluation, Air Force BA 3: Advanced Technology Development (ATD)		R-1 ITEM NOMENCLATURE PE 0603270F: Electronic Combat Technology		PROJECT 632432: Defensive System Fusion Technology		
B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
support/electronic attack architecture. Continue research into integration of electronic attack and information operations to defeat an adversary integrated air defense system. FY 2011 Base Plans: In FY 2011: Initiate a critical experiment to demonstrate synergistic electronic warfare (EW) and information operations (IO) techniques against a representative integrated air defense system. Initiate an effort to develop a virtual EW/IO battlespace environment for future project demonstrations, experiments, and assessments. Conduct a demonstration of electronic warfare battle management techniques and algorithms. Continue with the development of a distributed (multi-node) electronic support/electronic attack architecture. FY 2011 OCO Plans: In FY 2011 OCO: N/A.						
Accomplishments/Planned Programs Subtotals		5.558	4.543	4.707	0.000	4.707
		FY 2009	FY 2010			
Congressional Add: Advanced Threat Alert Advanced Technology Demonstration. FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for Advanced Threat Alert Advanced Technology Demonstration. FY 2010 Plans: In FY 2010: Not Applicable.		4.867	0.000			
Congressional Add: Commercial-Off-the-Shelf (COTS) Analysis Tools for Navigational Warfare.		1.197	0.000			

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B. Accomplishments/Planned Program (\$ in Millions)											
						FY 2009	FY 2010				
<i>FY 2009 Accomplishments:</i> In FY 2009: Conducted Congressionally-directed effort for COTS Analysis Tools for Navigational Warfare.											
<i>FY 2010 Plans:</i> In FY 2010: Not Applicable.											
Congressional Adds Subtotals						6.064	0.000				
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE Not Provided (6105): <i>Activity Not Provided</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0602204F: <i>Aerospace Sensors.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0603203F: <i>Advanced Aerospace Sensors.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
• PE 0603500F: <i>Multi-disciplinary Advanced Space Technology.</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D. Acquisition Strategy Not Applicable.											
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.											

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
63431G: <i>RF Warning & Countermeasures Tech</i>	9.609	21.250	4.142	0.000	4.142	5.502	6.854	7.190	7.028	Continuing	Continuing
A. Mission Description and Budget Item Justification This project develops and demonstrates advanced technologies for radio-frequency electronic combat suites to enhance the survivability of aerospace vehicles and to provide crew situational awareness. One major area addresses technologies for missile/threat warning, radio-frequency receivers, electronic combat pre-processors, advanced sorting/pre-processing algorithms, and expert software for applications on existing and future electronic combat systems. Another major technology area focuses on the development and demonstration of subsystems and components for generating on-board/off-board radio-frequency countermeasure techniques. This includes the development of electronic countermeasures techniques as well as advanced electronic countermeasures technologies such as antennas, power amplifiers, and preamplifiers.											
B. Accomplishments/Planned Program (\$ in Millions)											
							FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
MAJOR THRUST: Develop aerospace platform jamming technologies and techniques to counter advanced radio-frequency threats associated with current and future aerospace weapon systems.							6.417	20.055	4.142	0.000	4.142
FY 2009 Accomplishments: In FY 2009: Provided hardware simulation and analysis support to multi-intelligence sensor needs for accurate and timely electronic surveillance information. Developed advanced radar jamming engineering models including technique generators, wide band amplifier modules and apertures, needed to conduct network enabled research and evaluation of countermeasure techniques. Developed advanced simulation capabilities to support network enabled jamming of adversary early warning and surveillance networks. Developed and evaluated integrated digital receiver/jammer brassboard architectures that leverage real-time electronic surveillance signal processing to enhance electronic attack effectiveness.											

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2010 Plans: In FY 2010: Initiate advanced electronic attack jamming algorithms development for network operations to defeat future advanced threats. Continue to research the synergy between electronic protection and electronic attack technologies to realize more effective jamming. Demonstrate a distributed, multi-node electronic support/electronic attack concept. Continue research to tailor electronic attack techniques in combination with simultaneous information operations to counter the increasing adversary air defense systems moves to increased digital integration of defense sensors. Develop and assess advanced technology, concepts, and algorithms to mitigate the effects of advanced signals on radio frequency receiver-processors.					
FY 2011 Base Plans: In FY 2011: Initiate next-generation electronic attack techniques concept definition studies. Initiate a distributed tactical electronic combat receiver development effort. Demonstrate cognitive and adaptable electronic combat techniques and algorithms. Provide active electronic protection architecture concepts for transition.					
FY 2011 OCO Plans: In FY2011 OCO: N/A.					
Accomplishments/Planned Programs Subtotals	6.417	20.055	4.142	0.000	4.142
	FY 2009	FY 2010			
Congressional Add: Advanced Electromagnetic Location of IEDs Defeat System. FY 2009 Accomplishments: In FY 2009: Conduct Congressionally-directed effort for Advanced Electromagnetic Location of IEDs Defeat System.	1.596	1.195			

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B. Accomplishments/Planned Program (\$ in Millions)												
								FY 2009	FY 2010			
FY 2010 Plans: In FY 2010: Conduct Congressionally-directed effort for Advanced Electromagnetic Location of IEDs Defeat System.												
Congressional Add: New Electronic Warfare Specialists Through Advanced Research by Students. FY 2009 Accomplishments: In FY 2009: Conducted Congressionally-directed effort for New Electronic Warfare Specialists Through Advanced Research by Students. FY 2010 Plans: In FY 2010: Not Applicable.								1.596	0.000			
Congressional Adds Subtotals								3.192	1.195			
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost	
• PE Not Provided (6274): Activity Not Provided	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
• PE 0602204F: Aerospace Sensors.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
• PE 0604270F: Electronic Warfare (EW) Development.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
• PE 0603500F: Multi-disciplinary Advanced Space Technology.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
D. Acquisition Strategy												
Not Applicable.												

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

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
63691X: <i>EO/IR Warning & Countermeasures Tech</i>	8.133	6.263	8.143	0.000	8.143	10.842	10.507	11.035	11.064	Continuing	Continuing
A. Mission Description and Budget Item Justification This project develops and demonstrates the advanced warning and countermeasure technologies required to negate electro-optical, infrared, and laser threats to aerospace platforms. Off-board (decoys and expendables) and on-board countermeasure technologies developed for aircraft self-protection will provide robust, affordable solutions for protection against infrared missiles with autonomous seekers, multi-spectral threats, laser-guided weapons, and electro-optical and infrared tracking systems used to direct electro-optical, infrared, and radar-guided missiles.											
B. Accomplishments/Planned Program (\$ in Millions)											
							FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
MAJOR THRUST: Analyze the vulnerabilities of current infrared missile systems and future imaging infrared sensors. <i>FY 2009 Accomplishments:</i> In FY 2009: Performed laboratory analyses on future infrared guided missile capabilities. Assessed effectiveness of current and planned techniques against new threat trends and direction of future countermeasure technique requirements. Conducted digital simulations to assess effectiveness of expendable and laser countermeasure techniques. <i>FY 2010 Plans:</i> In FY 2010: Continue to perform laboratory analyses and assessments on infrared guided missiles and future imaging systems. Investigate countermeasures techniques that include laser jamming and jamming, expendables combinations. Conduct digital, injection, hardware-in-loop simulation to develop and assess countermeasures (CM) effectiveness. Obtain imaging threat to enable evaluation of postulated CM concepts. Support major advanced technology demonstrations through developmental test and evaluation.							4.424	1.654	2.987	0.000	2.987

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: In FY 2011: Continue laboratory development and testing of infrared countermeasures against current and advanced (i.e. imaging) missiles. Evaluate impact of confronting current and next generation threats on countermeasure design. Continue effort to obtain imaging threats. Continue support of major advanced technology demonstrations.						
FY 2011 OCO Plans: In FY 2011 OCO: N/A						
MAJOR THRUST: Develop aerospace laser warning sensor technologies for timely alert to advanced laser acquisition/tracking sensors, including detecting and locating both high and low power signals.		0.913	0.593	2.892	0.000	2.892
FY 2009 Accomplishments: In FY 2009: Developed laser warning sensors to address emerging laser threats. Developed miniaturized laser warning sensors. Fabricated a sensor for sensor and eye protection cueing. Demonstrated capability to cue agile filters for optimized protection against advanced laser threats.						
FY 2010 Plans: In FY 2010: Further develop laser warning sensors to address emerging laser threats. Demonstrate integration of miniaturized laser warning sensors in sensor protection, personnel protection and countermeasures cueing. Develop laser detection/warning/geolocation concepts for air based defense against medium and high energy lasers. Investigate advanced concepts for laser beam rider (laser augmented manpad) detection and geolocation. Demonstrate hardware-in-the-loop laser threat/sensor engagement testing for mission survivability testing.						
FY 2011 Base Plans: In FY 2011: Demonstrate advanced concepts for full spectrum laser threat detection/geolocation for countermeasure hand-off capable of supporting Combat Laser Infrared Countermeasure Survivability						

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B. Accomplishments/Planned Program (\$ in Millions)					
	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
System program goals. Demonstrate advanced concepts supporting airbase defense against medium and high energy lasers. FY 2011 OCO Plans: In FY 2011 OCO: N/A.					
MAJOR THRUST: Develop a countermeasure technology to defeat passive electro-optical and infrared aircraft tracking sensors and ordnance guidance. FY 2009 Accomplishments: In FY 2009: Initiated development of affordable, lightweight infrared countermeasures capability combining passive surveillance and missile defeat techniques for tactical aircraft. Initiated design of a compact system to geolocate and identify threats. FY 2010 Plans: In FY 2010: Continue development of affordable, lightweight infrared, laser countermeasures capability combining passive surveillance and missile defeat techniques for tactical aircraft. Continue design of capability to geolocation and identify passive infrared threats for targeting. FY 2011 Base Plans: In FY 2011: Not Applicable. Effort eliminated due to higher AF priorities. FY 2011 OCO Plans: In FY 2011 OCO: N/A.	2.649	1.662	0.000	0.000	0.000
MAJOR THRUST: Develop electro-optical/infrared missile warning technologies to alert aircrews and aircraft self-protection systems to the approach of advanced, low-signature threats.	0.147	0.148	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2009 Accomplishments: In FY 2009: Conducted missile warning sub-system integration of sensor, real-time processor and algorithms for a complete real-time visible missile warning system and for testing of the system in real-time environments.						
FY 2010 Plans: In FY 2010: Integrate visible missile warning system into the Affordable Laser Infrared Survivability System.						
FY 2011 Base Plans: In FY 2011: Not Applicable. Effort eliminated due to higher AF priorities.						
FY 2011 OCO Plans: In FY 2011 OCO: N/A.						
MAJOR THRUST: Develop electro-optical sensor component technology to advance multiple space mission areas. Develop new sensor components, topologies, and architectures for space.		0.000	2.206	2.264	0.000	2.264
FY 2009 Accomplishments: In FY 2009: Not Applicable.						
FY 2010 Plans: In FY 2010: Conduct space situational awareness (SSA) sensor prototype experiments.						
FY 2011 Base Plans: In FY 2011: Continue SSA sensor prototype experiments.						
FY 2011 OCO Plans: In FY 2011 OCO: N/A.						

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B. Accomplishments/Planned Program (\$ in Millions)														
										FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Accomplishments/Planned Programs Subtotals										8.133	6.263	8.143	0.000	8.143
C. Other Program Funding Summary (\$ in Millions)														
Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost			
• PE Not Provided (6503): Activity Not Provided	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
• PE 0602204F: Aerospace Sensors.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
• PE 0604270F: Electronic Warfare (EW) Development.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
• PE 0603500F: Multi-disciplinary Advanced Development Space Technology.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
• PE 0604270N: EW Development.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			
D. Acquisition Strategy Not Applicable.														
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.														

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