

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2014 Air Force	<b>DATE:</b> April 2013
--	-------------------------

APPROPRIATION/BUDGET ACTIVITY					R-1 ITEM NOMENCLATURE							
3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>					PE 0603270F: <i>Electronic Combat Technology</i>							
COST (\$ in Millions)	All Prior Years	FY 2012	FY 2013 <sup>#</sup>	FY 2014 Base	FY 2014 OCO <sup>##</sup>	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
Total Program Element	-	21.896	32.941	49.128	-	49.128	37.016	32.780	52.304	53.113	Continuing	Continuing
632432: <i>Defensive System Fusion Technology</i>	-	5.791	1.320	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
633720: <i>EW Quick Reaction Capabilities</i>	-	0.000	10.000	25.100	-	25.100	19.453	19.686	39.000	39.702	Continuing	Continuing
63431G: <i>RF Warning &amp; Countermeasures Tech</i>	-	5.192	15.508	20.126	-	20.126	13.009	8.500	8.578	8.600	Continuing	Continuing
63691X: <i>EO/IR Warning &amp; Countermeasures Tech</i>	-	10.913	6.113	3.902	-	3.902	4.554	4.594	4.726	4.811	Continuing	Continuing

<sup>#</sup> FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

<sup>##</sup> The FY 2014 OCO Request will be submitted at a later date

**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 four 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 integrates and focuses research efforts in electronic warfare (EW), directed energy weapons (DEW), and cyber warfare to rapidly demonstrate a capability for rapid fielding. The third project develops and demonstrates advanced technologies for radio-frequency electronic combat suites. The fourth project develops and demonstrates advanced warning and countermeasure technologies to defeat electro-optical, infrared, and laser threats to aerospace platforms. This program has been coordinated through the the Department of Defense (DoD) Science and Technology (S&T) Executive Committee process to harmonize efforts and eliminate duplication. 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.

**UNCLASSIFIED**

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Air Force				DATE: April 2013	
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 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	22.231	32.941	49.028	-	49.028
Current President's Budget	21.896	32.941	49.128	-	49.128
Total Adjustments	-0.335	0.000	0.100	-	0.100
• Congressional General Reductions	-	0.000			
• Congressional Directed Reductions	-	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	-	0.000			
• Congressional Directed Transfers	-	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-0.335	0.000			
• Other Adjustments	0.000	0.000	0.100	-	0.100

# UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force										DATE: April 2013		
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			
COST (\$ in Millions)	All Prior Years	FY 2012	FY 2013 <sup>#</sup>	FY 2014 Base	FY 2014 OCO <sup>##</sup>	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
632432: Defensive System Fusion Technology	-	5.791	1.320	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012												
## The FY 2014 OCO Request will be submitted at a later date												
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, stand off 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 stand off jammer technologies, and electronic collection methods to inform field commanders of changes in the electronic environment.												
B. Accomplishments/Planned Programs (\$ in Millions)										FY 2012	FY 2013	FY 2014
Title: Integrated Electronic Warfare Technologies										5.791	1.320	0.000
Description: Develop affordable radio-frequency and electro-optical emitter warning and electronic warfare (EW) battle management technologies, integrating EW and information operations.												
FY 2012 Accomplishments: Increased maturity and performed demonstrations of electronic warfare battle management (EWBM) capabilities. Focused efforts on Distributed Electronic Attack concepts for specific threats and radar classes. Initiated effort in understanding and countering traditional and non-traditional targets in support of irregular warfare (IW). Developed a virtual EW/information operations (IO) battlespace environment for future project demonstrations, experiments, and assessments.												
FY 2013 Plans: Continue development of Distributed Electronic Attack concepts for specific threats and radar classes.												
FY 2014 Plans: This effort moves to Project 63431G in this PE to better align efforts.												
Accomplishments/Planned Programs Subtotals										5.791	1.320	0.000
C. Other Program Funding Summary (\$ in Millions)												
N/A												

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force		DATE: April 2013
<b>APPROPRIATION/BUDGET ACTIVITY</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0603270F: <i>Electronic Combat Technology</i>	<b>PROJECT</b> 632432: <i>Defensive System Fusion Technology</i>
<b>C. Other Program Funding Summary (\$ in Millions)</b>		
<b>Remarks</b>		
<b>D. Acquisition Strategy</b> N/A		
<b>E. Performance Metrics</b> 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.		

# UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force									DATE: April 2013			
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 633720: EW Quick Reaction Capabilities			
COST (\$ in Millions)	All Prior Years	FY 2012	FY 2013 <sup>#</sup>	FY 2014 Base	FY 2014 OCO <sup>##</sup>	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
633720: EW Quick Reaction Capabilities	-	0.000	10.000	25.100	-	25.100	19.453	19.686	39.000	39.702	Continuing	Continuing
# FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012												
## The FY 2014 OCO Request will be submitted at a later date												
A. Mission Description and Budget Item Justification												
This project establishes a capability to rapidly assess, develop and demonstrate new electronic warfare concepts, techniques, and capabilities in the context of systemic EW effects (EW-threat interactions) in a congested/contested electromagnetic spectrum (EMS), system-of-systems (SoS) environment of the future. It develops disruptive EW and countermeasures concepts specifically selected for high-impact, game-changing effects; evaluates them in high fidelity virtual and hardware evaluation settings; and demonstrates them in an operationally relevant environment. It establishes and maintains an all-source, physics-based, threat-to-countermeasures EW systems engineering methodology. It develops a core analytic function, supported by simulation-based wargaming and interactive engineering modeling capabilities to evaluate advanced countermeasures concepts.												
B. Accomplishments/Planned Programs (\$ in Millions)									FY 2012	FY 2013	FY 2014	
Title: Distruptive EW and Countermeasure Technologies									0.000	4.000	11.700	
Description: Develop disruptive EW and countermeasure concepts specifically selected for rapidly fieldable, high-impact effects and demonstrate them in an operational environment.												
FY 2012 Accomplishments: N/A												
FY 2013 Plans: Initiate development of disruptive EW and countermeasure concepts and technologies initially identified for high-impact, game-changing effects in a contested EMS environment and begin initial evaluations thereof.												
FY 2014 Plans: Continue development of disruptive EW and countermeasures concepts and technologies specifically selected for high impact effects and demonstrate them in simulated or operational environments. Expand these systemic SoS developments to include GPS-denied techniques and technology solutions, networked-systems electronic protection (EP), and effects experimentation between/across EMS, cyber and directed energy (DE) domains.												
Title: Threat-to-Countermeasure System of Systems (SoS) Methods									0.000	3.000	5.800	
Description: Establish and maintain an all-source, physics-based, design-level, red-blue, comparative, threat-to-countermeasure SoS techniques methodology. This systems engineering-based EW approach will inform programmatic planning, quantify												

# UNCLASSIFIED

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2014 Air Force			<b>DATE:</b> April 2013		
<b>APPROPRIATION/BUDGET ACTIVITY</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>		<b>R-1 ITEM NOMENCLATURE</b> PE 0603270F: <i>Electronic Combat Technology</i>		<b>PROJECT</b> 633720: <i>EW Quick Reaction Capabilities</i>	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>			<b>FY 2012</b>	<b>FY 2013</b>	<b>FY 2014</b>
desirable research areas with realistic SoS metrics, and foster improved understanding of future concept contributions to EW warfighting capabilities.					
<b>FY 2012 Accomplishments:</b> N/A					
<b>FY 2013 Plans:</b> Initiate development of an all-source, physics-based, design-level, red-blue, comparative, threat-to-countermeasure SoS techniques methodology.					
<b>FY 2014 Plans:</b> Continue development of an all source, physics based, design level, red-blue, comparative, threat-to countermeasure SoS techniques methodology for use in concept development and simulation based testing. Initiate integration of SoS engineering methods across virtual/modeling, hardware-in-the-loop (HWIL) and systems integration lab (SIL) options to optimize end-to-end (threat-to-countermeasure) systemic effects.					
<b>Title:</b> Evaluation of Advanced Countermeasure Concepts			0.000	3.000	7.600
<b>Description:</b> Develop a core analytic function, supported by a simulation-based wargaming and engineering modeling capabilities, for evaluation, development, and demonstration of advanced EW, cyber, DE and integrated/systemic, non-kinetic concepts to include special capability programs.					
<b>FY 2012 Accomplishments:</b> N/A					
<b>FY 2013 Plans:</b> Initiate development of a core analytic function, supported by a simulation-based wargaming and engineering modeling capabilities, for evaluation, development, and demonstration of advanced EW, cyber, DE and integrated systemic, non-kinetic concepts to include special capability programs.					
<b>FY 2014 Plans:</b> Continue development of a core analytical function, supported by a simulation based war gaming and engineering modeling capabilities, for evaluation, development, and demonstration of advanced countermeasure concepts to include special capability programs. Expand evaluation capabilities to incorporate full systemic EMS effects and netted/distributed EW capabilities in anti-access/area denial (A2/AD) scenarios.					
<b>Accomplishments/Planned Programs Subtotals</b>			0.000	10.000	25.100

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2014 Air Force		<b>DATE:</b> April 2013
<b>APPROPRIATION/BUDGET ACTIVITY</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>	<b>R-1 ITEM NOMENCLATURE</b> PE 0603270F: <i>Electronic Combat Technology</i>	<b>PROJECT</b> 633720: <i>EW Quick Reaction Capabilities</i>
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A		
<b>Remarks</b>		
<b>D. Acquisition Strategy</b> N/A		
<b>E. Performance Metrics</b> 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.		

# UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force									DATE: April 2013			
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 63431G: RF Warning & Countermeasures Tech			
COST (\$ in Millions)	All Prior Years	FY 2012	FY 2013 <sup>#</sup>	FY 2014 Base	FY 2014 OCO <sup>##</sup>	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
63431G: RF Warning & Countermeasures Tech	-	5.192	15.508	20.126	-	20.126	13.009	8.500	8.578	8.600	Continuing	Continuing
<sup>#</sup> FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012												
<sup>##</sup> The FY 2014 OCO Request will be submitted at a later date												
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 Programs (\$ in Millions)									FY 2012	FY 2013	FY 2014	
Title: Electronic Attack									5.192	15.508	20.126	
Description: Develop aerospace platform jamming technologies and techniques to counter advanced radio-frequency (RF) threats associated with current and future aerospace weapon systems.												
FY 2012 Accomplishments: Demonstrated adaptable electronic attack (EA) technique concepts against a modeled threat environment. Initiated effort to develop a Network electronic support/electronic attack (ES/EA) Experiments Lab. Demonstrated a cognitive jammer system concept in a laboratory environment. Defined and analyzed proactive electronic protection (EP) concepts. Conducted effort on next generation RF threats and potential EW concepts.												
FY 2013 Plans: Continue to demonstrate adaptable electronic attack (EA) technique concepts against a modeled threat environment. Continue to develop and demonstrate a cognitive jammer system concept in a laboratory environment. Continue to assess and analyze proactive electronic protection (EP) concepts. Continue effort to focus on next generation RF threats and potential EW concepts.												
FY 2014 Plans:												



# UNCLASSIFIED

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2014 Air Force		<b>DATE:</b> April 2013	
<b>APPROPRIATION/BUDGET ACTIVITY</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>		<b>R-1 ITEM NOMENCLATURE</b> PE 0603270F: <i>Electronic Combat Technology</i>	<b>PROJECT</b> 63431G: <i>RF Warning &amp; Countermeasures Tech</i>
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2012</b>	<b>FY 2013</b>
Continue to develop and demonstrate adaptable electronic attack (EA) technique concepts, cognitive jammer system concepts, and advanced EP concepts to defeat next generation RF threats, with a major emphasis on penetrating contested, anti-access/area denial environments.			
<b>Accomplishments/Planned Programs Subtotals</b>		5.192	15.508
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A			
<b>Remarks</b>			
<b>D. Acquisition Strategy</b> N/A			
<b>E. Performance Metrics</b> 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.			

# UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2014 Air Force									DATE: April 2013			
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 63691X: EO/IR Warning & Countermeasures Tech			
COST (\$ in Millions)	All Prior Years	FY 2012	FY 2013 <sup>#</sup>	FY 2014 Base	FY 2014 OCO <sup>##</sup>	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
63691X: EO/IR Warning & Countermeasures Tech	-	10.913	6.113	3.902	-	3.902	4.554	4.594	4.726	4.811	Continuing	Continuing
<sup>#</sup> FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012												
<sup>##</sup> The FY 2014 OCO Request will be submitted at a later date												
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 Programs (\$ in Millions)									FY 2012	FY 2013	FY 2014	
Title: Advanced EO/IR Warning and Countermeasure Technologies									10.913	6.113	3.902	
Description: Analyze the vulnerabilities of current infrared missile systems and future imaging infrared sensors. Develop advanced countermeasure system technologies to exploit vulnerabilities for use against infrared and electro-optical guided missile threats. Develop advanced optical and infrared sensor systems for airborne and space situational awareness and threat warning.												
FY 2012 Accomplishments: Developed, tested, and refined infrared countermeasures concepts and techniques against current infrared missile systems and future advanced threat sensors. Developed surrogate imaging sensors, processors, and track algorithms to test and evaluate countermeasure concepts against advanced threat systems. Developed new laser warning concepts and simulation capability to address emerging directed energy threats to provide situational awareness and threat warning. Initiated space situational awareness sensor prototype experiment phase II.												
FY 2013 Plans: Continue to develop, test, and refine infrared countermeasures concepts and techniques against current infrared missile systems and future advanced threat sensors. Continue development of surrogate imaging sensors, processors, and track algorithms to test and evaluate countermeasure concepts against advanced threat systems. Perform advanced proactive infrared countermeasures (PIRCM) search, detect, and countermeasure research. Develop concepts for protection of postulated future threats to 6th generation aircraft including definition of component and subsystem requirements.												
FY 2014 Plans:												

# UNCLASSIFIED

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2014 Air Force		<b>DATE:</b> April 2013	
<b>APPROPRIATION/BUDGET ACTIVITY</b> 3600: <i>Research, Development, Test &amp; Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>		<b>R-1 ITEM NOMENCLATURE</b> PE 0603270F: <i>Electronic Combat Technology</i>	<b>PROJECT</b> 63691X: <i>EO/IR Warning &amp; Countermeasures Tech</i>
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2012</b>	<b>FY 2013</b>
Continue to develop, test, and refine infrared countermeasures concepts with emphasis on penetrating contested, anti-access/area denial environments. Continue development of surrogate imaging sensors, processors, and track algorithms and perform advance proactive infrared countermeasure (PIRCM) search, detect, and countermeasure research. Develop concepts for protection of postulated future threats to 6th generation aircraft including definition of component and subsystem requirements.			
<b>Accomplishments/Planned Programs Subtotals</b>		10.913	6.113
<b>C. Other Program Funding Summary (\$ in Millions)</b> N/A			
<b>Remarks</b>			
<b>D. Acquisition Strategy</b> N/A			
<b>E. Performance Metrics</b> 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.			