Exhibit R-2, PB 2010 Office of Secretary Of Defense RDT&E Budget Item Justification								DATE: May 2009		
APPROPRIATION/BUDGET ACTIVITY 0400 - Research, Development, Test & Evaluation, Defense-Wide/BA 3 - Advanced Technology Development (ATD)					R-1 ITEM NOMENCLATURE PE 0603618D8Z Joint Electronic Advanced Technology					
COST ($ in Millions)	**FY 2008 Actual**	**FY 2009 Estimate**	**FY 2010 Estimate**	**FY 2011 Estimate**	**FY 2012 Estimate**	**FY 2013 Estimate**	**FY 2014 Estimate**	**FY 2015 Estimate**	**Cost To Complete**	**Total Cost**
Total Program Element	12.145	10.463	10.838						Continuing	Continuing
P619: Joint Electronic Advanced Technology	12.145	10.463	10.838						Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) In the Overseas Contingency Operation, the United States (U.S.) must be ready to meet the widespread and growing threat of Man Portable Air Defense Systems (ManPADS) and other asymmetric threats of portable small weapons improvised from commercially available electronic sensors, computer modules, navigation and control components coupled with widely proliferated explosives, mortars, rockets and small manned or unmanned aircraft. Such devices provide terrorists and foreign military units the novel means to rapidly construct a wide range of weapons capable of disruptive actions against civilian and military forces alike. The U.S. must be ready to counter such weapons on short notice.

(U) The asymmetric nature of such devices is already well understood by terrorists. Improvised explosive devices are in widespread use. ManPADS and mortars have been used to attack both air and ground forces, and pose a threat to any region due to their portability. Unmanned Aerial Vehicles (UAVs) capable of short range operations involving chemical, biological or explosive payloads can be found routinely available through commercial purchase and are easily adaptable to conduct precision attacks for terror purposes using commercial radio control systems. Civil navigation and autopilot devices capable of precisely controlling UAVs can be held in the palm of the hand. Digital processors, analog-to-digital converters and digital optical sensors give terrorists the means to deploy unexpected threats on short notice. Conventional kinetic defenses against these devices can be impractical in urban settings. Because the speed of appearance of these disruptive devices can be short, such threats are asymmetric in comparison with the typical long development cycles associated with U.S. military defensive systems. Together these asymmetries highlight the need to rapidly evolve alternative Electronic Warfare, Information Operations and Counter Terrorism capabilities suitable for neutralizing such threats. This program element will investigate novel means to detect and neutralize these asymmetric threats, as well as methods to employ asymmetric principals against our adversaries.

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B. Program Change Summary ($ in Millions)

	FY 2008	FY 2009	FY 2010	FY 2011
Previous President's Budget	12.311	9.320	9.529	
Current BES/President's Budget	12.145	10.463	10.838	
Total Adjustments	-0.166	1.143	1.309	
Congressional Program Reductions				
Congressional Rescissions		-0.057		
Total Congressional Increases		1.200		
Total Reprogrammings				
SBIR/STTR Transfer	-0.141			
Other	-0.025		1.309	

Congressional Increase Details ($ in Millions)

	FY 2008	FY 2009
Project: P619, **Advanced Tactical Laser Flashlight Devices**		1.200

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COST ($ in Millions)	FY 2008 Actual	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
P619: Joint Electronic Advanced Technology	12.145	10.463	10.838						Continuing	Continuing

A. Mission Description and Budget Item Justification

(U) The widespread and growing availability of sophisticated, commercially available electronic sensors, computer modules, navigation and control components coupled with widely proliferated Man Portable Air Defense Systems (ManPADS), portable explosives, mortars, rockets and small aircraft provide terrorists and foreign military units with the novel means to rapidly construct a wide range of weapons capable of disruptive actions against military forces. In the Overseas Contingency Operation, the United States (U.S.) must be ready to counter such weapons on short notice. The asymmetric nature of such devices is already well understood by terrorists. Improvised explosive devices are in widespread use. ManPADS, man portable weapons and mortars have been used to attack both air and ground forces, and pose a threat to any region due to their portability. Unmanned Aerial Vehicles (UAVs) capable of short range operations involving chemical, biological or explosive payloads can be found routinely available through commercial purchase and are easily adaptable to conduct precision attacks for terror purposes using commercial radio control systems. Civil navigation and autopilot devices capable of precisely controlling UAVs can be held in the palm of the hand. Digital processors, analog-to-digital converters and digital optical sensors give terrorists the means to deploy unexpected threats on short notice. Because conventional kinetic defenses against these devices can be impractical in urban settings and because the speed of appearance of such devices can be short, such threats are disruptive and asymmetric in comparison with the typical long development cycles associated with U.S. military defensive systems. Together these asymmetries highlight the need to rapidly evolve alternative Electronic Warfare, Information Operations and Counter Terrorism capabilities suitable for neutralizing such threats. This program element will investigate novel means to detect and neutralize these asymmetric threats, as well as methods to employ asymmetric principles against our adversaries.

(U) This program element seeks to identify rapidly deployable solutions (outside of service programs of record) that can effectively mitigate asymmetric threats by integrating advanced commercial or military off-the-shelf technology in innovative ways that augment and/or reduce risk when inserted into service programs of record. Laboratory and field testing will be used to evaluate the feasibility and military utility of resultant low cost, near term capabilities. FY 2010 efforts will investigate, integrate, test and demonstrate elements of the following technologies:

1. Ground based Counter ManPADS concepts and systems that provide area protection in the vicinity of military airports, expeditionary airfields, or other high value locations. A second complete distributed ground based missile warning system will be built and evaluated at a major urban airport to collect clutter data and verify performance enhancements developed in FY 2008 and FY 2009. This missile warning system is being initially integrated with aircraft based countermeasures systems. Potentially viable ground based countermeasures concepts will be evaluated and tested to assess developmental risk. Subsequent efforts will assess integration of ground based missile warning/tracking systems with future ManPADS countermeasures systems.

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2. Low cost, near term technologies to allow Department of Defense aircraft to fly in medium to high Man Portable Air Defense Systems (ManPADS) threat airspace in support of the Overseas Contingency Operation (OCO). Emphasis is on aircraft and system approaches not covered by existing programs of record; including innovative active missile warning, advanced kinetic decoys, data linked warning and countermeasures, and preemptive countermeasures systems. Initial tasks for a full live fire demonstration will be completed.

3. Emerging commercially derived technologies; including rapid prototyping of those required to combat adaptive threats in the OCO including, small Unmanned Aerial Vehicle detection and engagement by kinetic and non-kinetic means. Emphasis will be on demonstrating an end-to-end kill chain and techniques which minimize or eliminate collateral damage. New efforts starting in FY 2010 and FY 2011 will include novel techniques to detect and locate the signatures of terrorist activities using electronic means.

B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
Ground Based Counter-Man Portable Air Defense Systems	1.914	2.300	3.400	

Ground based Counter ManPADS concepts and systems that provide area protection in the vicinity of military airports, expeditionary airfields, or other high value locations. A second complete distributed ground based missile warning system will be built and evaluated at a major urban airport to collect clutter data and verify performance enhancements developed in FY 2008 and FY 2009. This missile warning system is being initially integrated with aircraft based countermeasures systems. Potentially viable ground based countermeasures concepts will be evaluated and tested to assess developmental risk. Subsequent efforts will assess integration of ground based missile warning/tracking systems with future ManPADS countermeasures systems.

FY 2008 Accomplishments:

Accomplishments include thermal signature data that was collected on a representative set of fixed-wing commercial aircraft suitable for Civil Reserve Air Fleet operations; Infrared (IR) sensors were evaluated for missile detection performance and suitability; ground-engagement concepts were modeled and evaluated; integration and tracking software was developed and refined; and detection and tracking performance were evaluated in more than 180 live fire events; and several ground-based directed energy engagement concepts, including the General Dynamics Counter-MANPADs Airspace Protection System (CMAPS), were jointly reviewed with other agencies/industry. The results yielded a one-of-a-kind large, fixed-wing aircraft data base for shared use by Department of Defense and Department of Homeland Security that has been used by United States allies and airport security officials alike; a proven, three-

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
element IR sensor array whose demonstrated performance in a four-pole configuration is capable of exceeding required detection and tracking parameters under constrained launch conditions for all threats tested. An initial live-fire demonstration of the unconstrained CMAPS system configuration combined with directed energy devices to defeat a live-fire missile was accomplished in early FY 2008. *FY 2009 Plans:* Under a Cooperative Research and Development Agreement with Army Research Laboratory and Northrop-Grumman, perform initial testing of a novel ground based countermeasures technique. Follow-on testing will include static testing at a range followed by live fire testing in FY 2010 through FY 2012. Develop proposals for testing the Raytheon Vigilant Eagle high powered microwave airspace protection system in a live fire environment. Other planned accomplishments include thermal signature data collection on a representative set of fixed-wing commercial aircraft suitable for Civil Reserve Air Fleet operations; evaluate Infrared (IR) sensors for missile detection performance and suitability; model and evaluate ground-engagement concepts; develop and refine integration and tracking software; evaluate detection and tracking performance in more than 180 live fire events; and jointly review several ground-based directed energy engagement concepts, including the General Dynamics Counter-Man Portable Air Defense Systems (ManPADS) Airspace Protection System (CMAPS), with other agencies/industry. The results should yield a one-of-a-kind large, fixed-wing aircraft database for shared use by Department of Defense and Department of Homeland Security used by United States allies and airport security officials alike; a proven, three-element IR sensor array whose demonstrated performance in a four-pole configuration is capable of exceeding required detection and tracking parameters under constrained launch conditions for all threats tested. Plan to accomplish a live-fire demonstration of the unconstrained CMAPS system configuration combined with directed energy devices to defeat a live-fire missile. *FY 2010 Plans:* This project integrates netted, ground-based, IR sensor technologies including the Distributed Ground Based Threat Detection System. By combining high-speed, high-resolution tracking mechanisms with either on-board decoys or on-/off-board directed-energy devices, it seeks to demonstrate the end-to-end capability to detect, track, and defeat shoulder-fired, ManPADS known to be in the hands of terrorists in Iraq and elsewhere. Subsequent efforts will complete the assessment of this system and will document				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
performance characteristics for consideration by force protection planners, integrated military base defense experts, and homeland defense officials. FY 2010 will develop a portable missile verification system; test and measure this system for its ability to detect, warn and track other threats such as aircraft, cruise missiles, and Unmanned Aerial Vehicles whose signatures represent a difficult challenge for many conventional weapons systems. FY 2010 will address mobility and militarization of what is initially all commercial off-the-shelf hardware with custom software. Follow-on testing will continue under the Cooperative Research and Development Agreement with Army Research Laboratory and Northrop-Grumman.				
Low Cost/Near Term Counter-Man Portable Air Defense Systems Low cost, near term technologies to allow Department of Defense aircraft to fly in medium to high Man Portable Air Defense Systems (ManPADS) threat airspace in support of the Overseas Contingency Operation (OCO). Emphasis is on aircraft and system approaches not covered by existing programs of record; including innovative active missile warning, advanced kinetic decoys, data linked warning and countermeasures, and preemptive countermeasures systems. Initial tasks for a full live fire demonstration will be completed. *FY 2008 Accomplishments:* Accomplishments include: produced a proof of concept event which positively confirmed the ability of the system to defeat a MANPADs under live-fire conditions by automatically remotely triggering flares on drone aircraft. Completed the analysis of previous laboratory, anechoic chamber characterization, and live fire testing of selected components; initially evaluated pyrophoric material effectiveness in a responsive scenario. Published final report on combined active and passive MANPADs testing. United States Marine Corps CH-46 community embraced the concept with a draft Urgent Operational Needs Statement for active missile warning on large helicopters. Completed phase I of a three phase project to combine ground based passive missile warning with a data link to a UH-1Y/AH-1Z equipped with flares. Briefed PMA-276 on plans for a phase II and III. Completed System Requirements Review on a database project based upon our Electronic Warfare database capability to create an IR Countermeasure effectiveness database.	4.674	2.368	3.004	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
FY 2009 Plans: Complete phase II of a three phase project to combine ground based passive missile warning with a data link to a UH-1Y/AH-1Z equipped with flares. Brief PMA-276 on plans for phase III. Produce a proof of concept event which positively confirmed the ability of the system to defeat a Man Portable Air Defense Systems (ManPADS) under live-fire conditions by automatically remotely triggering flares on drone aircraft. Complete the analysis of previous laboratory, anechoic chamber characterization, and live fire testing of selected components; initially evaluated pyrophoric material effectiveness in a responsive scenario. Publish final report on active ManPADS testing. Complete planning for a database project based upon our Electronic Warfare database capability to create an Infrared countermeasure effectiveness database. *FY 2010 Plans:* This project completes ongoing efforts to determine the feasibility of substantially improving the protection of air platforms by combining ground based detection with airborne pyrophoric countermeasures. In FY 2010, Program Element 0603618D8Z will advance this hybrid countermeasure project to demonstrate a tactical data link useable on UH-1/AH-1 platforms of ManPADS detection, tracking, warning and engagement under all-aspect launch conditions and will complete the integration required for a separately funded initial flight demonstration of the integrated system and countermeasures called Aircraft ManPADS Protection System. Air platform protection can reduce false alarm events by combining existing active and passive sensors with advanced sensor fusion software. Current operations have shown that missile detection and warning systems now used by United States and coalition forces are adversely affected by the large number of background events. The technologies under examination use multiple spectrally independent sensors and fusion algorithms, since at least one sensor would always be free of interference, it is estimated that the fusion could reduce false alarms to near-zero levels while retaining exceptionally high threat detection rates. Joint and Allied Threat Awareness System will transition multi-spectral missile warning as part of its System Development Demonstration program. FY 2010 will use measured data to update simulated performance objectives prior to attempting an on-aircraft integration and evaluation; will conclude testing				

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
to verify and validate performance and will document results for inclusion in future aircraft force protection programs.				
Disruptive Technology Defeat Emerging commercially derived technologies; including rapid prototyping of those required to combat adaptive threats in the OCO including, small Unmanned Aerial Vehicle detection and engagement by kinetic and non-kinetic means. Emphasis will be on demonstrating an end-to-end kill chain and techniques which minimize or eliminate collateral damage. New efforts starting in FY 2010 and FY 2011 will include novel techniques to detect and locate the signatures of terrorist activities using electronic means. *FY 2008 Accomplishments:* Accomplishments include: documented various Unmanned Aerial Vehicle (UAV) signatures, sensors and defeat mechanisms to assess the current range at which such UAVs can be reasonably detected and determined state of the art, unconventional, near-term defeat options, including directed energy options. Hosted premier Counter-UAV event, currently the largest known database for sensor-weapons detection and response capabilities. Addressed risks identified by Defense Science Board, United States Air Force Science Advisory Board, Chief of Naval Operations Deep Blue, and Department of Homeland Security. Completed numerous studies for Office of the Secretary of Defense-Acquisition Technology and Logistics (AT&L), including a congressionally directed helicopter survivability study. Supported the AT&L Joint Analysis Team to provide subject matter expertise for this ongoing study as directed by the Under Secretary of Defense. *FY 2009 Plans:* Host premier Counter Unmanned Aerial Vehicle (UAV) event, nicknamed Black Dart, currently the largest known database for sensor-weapons detection and response capabilities. Document various UAV signatures, sensors and defeat mechanisms to assess the current range at which such UAVs can be reasonably detected and determined state of the art, unconventional, near-term defeat options, including directed energy options. Address risks identified by Defense Science Board, United States Air Force Science Advisory Board, Chief of Naval Operations Deep Blue, and Department of Homeland Security. Complete numerous studies for Office of the Secretary of Defense-AT&L. Provide subject	5.557	4.595	4.434	

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B. Accomplishments/Planned Program ($ in Millions)	FY 2008	FY 2009	FY 2010	FY 2011
matter technical expertise to the AT&L Joint Analysis Team for this ongoing study as directed by the Under Secretary of Defense. *FY 2010 Plans:* This project will provide expertise to Joint Integrated Air and Missile Defense Organization, jointly with USNORTHCOM, for a variety of United States defense systems to be demonstrated and evaluated in the May 2010 timeframe and to demonstrate an end-to-end kill chain. FY 2010 efforts will be developed in coordination with the defense research community and DIA elements seeking ways to avoid technological surprise. Further efforts will investigate novel means of detecting and locating signatures of terrorist activity, differentiating between terrorist and indigenous activities and providing timely, actionable intelligence that allows asymmetric disruption of terrorist kill chains.				
Advanced Tactical Laser Flashlight Devices *FY 2009 Plans:* United States Army will be the lead for Advanced Tactical Laser Flashlight Devices.	0.000	1.200	0.000	

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A