OSD RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

Date: February 2007

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE
RDT&E/ Defense Wide BA# 3	**0603618D8Z - Joint Electronic Advanced Technology**

Cost ($ in Millions)		FY 2006 Actual	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Total Program Element (PE) Cost		0.000	10.341	9.219	9.338	9.620	9.948	10.079	10.220
P619	Joint Electronic Advanced Technology	0.000	10.341	9.219	9.338	9.620	9.948	10.079	10.220

A. Mission Description and Budget Item Justification: In the Global War on Terror (GWOT), the U.S must be ready to meet the widespread and growing theat of sophisticated devices improvised from commercially available electronic sensors, computer modules, navigation and control components coupled with widely proliferated, man-portable explosives, mortars, rockets and small 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.

The asymmetric nature of such devices is already well understood by terrorists. Improvised explosive devices are in widespread use. 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 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. Global Positioning System (GPS) civil navigation and autopilot devices capable of precisely controlling Unmanned Aerial Vehicles (UAV) can be held in the palm of ones 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 typically long and costly 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.

B. Program Change Summary	FY 2006	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2007)	0.000	9.400	9.500	9.600
Current BES/President's Budget (FY 2008/2009)	0.000	10.341	9.219	9.338
Total Adjustments	0.000	0.941	-0.281	-0.262
Congressional Program Reductions		-0.059		
Congressional Rescissions				
Congressional Increases		1.000		
Reprogrammings				
SBIR/STTR Transfer				
Other			-0.281	-0.262

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C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

E. Performance Metrics: Not Applicable.

OSD RDT&E PROJECT JUSTIFICATION (R2a Exhibit)

Date: February 2007

APPROPRIATION/ BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
RDT&E/ Defense Wide BA# 3	**0603618D8Z - Joint Electronic Advanced Technology**	**P619**

Cost ($ in Millions)		FY 2006 Actual	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
P619	Joint Electronic Advanced Technology	0.000	10.341	9.219	9.338	9.620	9.948	10.079	10.220

A. Mission Description and Project Justification: The widespread and growing availability of sophisticated, commercially available electronic sensors, computer modules, navigation and control components coupled with widely proliferated, man-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 civilian and military forces alike. In the Global War on Terror (GWOT), the 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 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 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. GPS civil navigation and autopilot devices capable of precisely controlling UAVs can be held in the palm of ones 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 typically long and costly 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 seeks to identify low-cost, near-term solutions (outside of service programs of record) that can effectively mitigate asymmetric threats by rapidly integrating advanced commercial or military off-the-shelf technology in innovative ways. Laboratory and field testing will be used to evaluate the feasibility and military utility of resultant low cost, near term capabilities. FY 2007 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 or other high value locations. A distributed ground based missile warning system will be refined, expanded and evaluated for its ability to increase probability of detection and decrease false alarms from the benchmark performance of aircraft based systems. This missile warning system will be initially integrated with aircraft based countermeasures systems. Several potentially viable ground based countermeasures concepts will be refined and tested to assess developmental risk. Subsequent efforts will assess integration of ground based missile warning/tracking systems, ManPADS countermeasures systems and other rapid means of engagement.
2. Low cost, near term technologies to allow DoD aircraft to fly in medium to high ManPAD threat airspace in support of the Global War on Terror. Emphasis is on aircraft and system approaches not covered by existing programs of record; including innovative fused-sensor missile warning, advanced decoys, and preemptive countermeasure systems.
3. Emerging commercially derived technologies; including rapid prototyping of those required to combat adaptive threats in the GWOT including, initially Small Unmanned Aerial Vehicle (UAV) detection and engagement.

The objective of this effort is to assess and prototype low cost/near term EW/IO technologies that augment and/or reduce risk when inserted into service programs of record. Opportunities to provide breakthrough technologies and low cost upgrade opportunities are emphasized.

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B. Accomplishments/Planned Program:

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
Ground Based Counter-ManPADS:	0.000	2.000	1.019	0.300

FY 2007/2008/2009 Plans: This project assumes control of netted, ground-based, Infrared (IR) sensor technologies originally developed in FY05-06 under PE0604618D8Z . By combining high-speed, high-resolution tracking mechanisms with either onboard decoys or on-/off-board directed-energy devices, it seeks to demonstrate the end-to-end capability to detect, track, and defeat shoulder-fired, man-portable air defense (MANPAD) systems known to be in the hands of terrorists in IRAQ and elsewhere. Under the previous 6.4 effort, thermal signature data was collected on a representative set of fixed-wing commercial aircraft suitable for CRAF operations; 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 120 live fire events; and several ground-based directed energy engagement concepts, including the General Dynamics, Ground MANPAD Defeat System, were jointly reviewed with other agencies/industry. The resultant products of these prior efforts have yielded an one-of-a-kind large, fixed-wing aircraft data base for shared use by DOD and DHS that has subsequently been requested for use by US allies and airline officials alike; a proven, 3-element IR sensor array whose demonstrated performance in a 2-pole configuration is capable of exceeding required detection and tracking parameters under constrained launch conditions for all threats tested; and a proof of concept event which positively confirmed the ability of the system to defeat a MANPAD under live-fire conditions by automatically remotely triggering flares on drone aircraft. In FY07-08, PE0603618D8Z will advance this ground-based sensor project to demonstrate a 4-pole system configuration capable of MANPAD detection, tracking, warning and engagement under all-aspect launch conditions and will complete the assessment of alternative ground-based directed energy devices capable of deceiving or disabling the primary MANPAD systems in terrorist inventories at ranges comparable to that of the missiles themselves. An initial live-fire demonstration of the unconstrained system configuration combined with directed energy devices to defeat a live-fire missile is projected for summer 2007. FY08 efforts will complete the assessment of this system in combination with other, available ground-based MANPAD defeat devices and will document performance characteristics for consideration by force protection planners, integrated military base defense experts, and homeland defense officials. FY07-08 will also test and measure this system for its ability to detect, warn and track other threats such as aircraft, cruise missiles, and UAVs whose signatures represent a difficult challenge for many conventional weapons systems.

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
Low Cost/Near Term Counter-ManPADS:	0.000	6.841	5.200	1.900

FY 2007/2008/2009 Plans: This project extends FY06 efforts originally initiated under PE0604618D8Z to determine the feasibility of substantially improving the protection of air platforms by reducing false alarm events by combining existing active and passive sensors with advanced sensor fusion software. Current operations in the middle east have shown that missile detection and warning systems now used by US and coalition forces are adversely affected by the large number of background events radiating in the ultraviolet (UV) spectrum and the average response recovery time of sensors exposed to high-intensity flares at short range. The technologies under examination uses 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. FY07-08 will complete the analysis of previous laboratory, anechoic chamber characterization, and live fire testing of selected components; will initiate collection and analysis urban false alarm testing of Doppler sensor system; will evaluate pyrophoric material effectiveness in a responsive scenario; will use measured data to update simulated performance objectives prior to attempting an on-aircraft integration and evaluation; FY-08 will conclude testing to verify and validate performance and will document results for inclusion in future aircraft force protection programs. The management and sustainment of the IR signatures database developed in FY 06 will be funded from this project in FY07-09

Accomplishment/Planned Program Title	FY 2006	FY 2007	FY 2008	FY 2009
Electronic Advanced Technology:	0.000	1.500	3.000	7.138

FY 2007/2008/2009 Plans: Unconventional and disruptive technology defeat concepts. This effort recognizes the asymmetric nature of devices and tactics being developed by various nation-state and terror

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organizations on an adversarial footing with the U.S.. In some circumstances such technologies are being adapted at rates faster than conventional defense systems can reasonably respond; in other cases, the cost of the response options are far in excess of the threat development costs—creating inefficiencies and incompatibilities in developing cost effective alternatives. This project recognizes the near-term nature of one such threat which is quickly proliferating and which has demonstrated interest to terror organizations—the small UAV. Such UAVs can be used individually as terror weapons through the incorporation of small chemical, biological or explosive components, or can serve as detonation initiators in combination with larger explosive stockpiles. Because the small UAV is both inherently hard to detect and low in cost relative to conventional counter-air defense systems, it is a unique candidate for alternative, low-cost detection and defeat mechanisms. A recent USAF Science Advisory Board study on UAV Detection and Defeat, highlights the complexities and risks of this problem which spans traditional counter-military operations and spills over into homeland defense. Because of the lack of clear solutions to the detection and defeat problem, this project will join with exercise events planned in coordination with USNORTHCOM and DIA to document various UAV signatures, sensors and defeat mechanisms to assess the current range at which such UAVs can be reasonably detected and to determine state of the art, unconventional, near-term defeat options, including directed energy options. This project will fund targets for testing and will jointly with NORTHCOM arrange for a variety of US defense systems to be demonstrated and evaluated in the MAY 07 timeframe. FY09 expenditures will be developed in coordination with the defense research community and DIA elements seeking ways to avoid technological surprise.

C. Other Program Funding Summary: Not Applicable.

D. Acquisition Strategy: Not Applicable.

E. Major Performers Not Applicable.