

OSD RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2008

APPROPRIATION/ BUDGET ACTIVITY
RDTE, Defense Wide BA 03

PE NUMBER AND TITLE
0603618D8Z - Joint Electronic Advanced Technology

COST (\$ in Millions)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
P619 Joint Electronic Advanced Technology	10.692	12.311	9.320	9.529	9.851	9.982	10.122

A. Mission Description and Budget Item Justification: In the Global War on Terror, the United States (U.S.) must be ready to meet the widespread and growing threat of Man Portable Air Defense Systems (ManPADS) and 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. 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. Global Positioning System 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.

<u>B. Program Change Summary</u>	FY 2007	FY 2008	FY 2009
Previous President's Budget (FY 2008)	10.341	9.219	9.338
Current BES/President's Budget (FY 2009)	10.692	12.311	9.320
Total Adjustments	0.351	3.092	-0.018
Congressional Program Reductions		-0.108	
Congressional Rescissions			
Congressional Increases		3.200	
Reprogrammings	-0.100		
SBIR/STTR Transfer	-0.031		
Other	0.482		-0.018

C. Other Program Funding Summary Not applicable for this item.

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D. Acquisition Strategy Not applicable for this item.

E. Performance Metrics: Not Applicable.

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COST (\$ in Millions)	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate	
P619 Joint Electronic Advanced Technology	10.692	12.311	9.320	9.529	9.851	9.982	10.122	

A. Mission Description and Budget Item Justification: 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 Global War on Terror (GWOT), 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 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. Global Positioning System 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 (EW/IO) 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 2009 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 Department of Defense aircraft to fly in medium to high ManPADS threat airspace in support of the GWOT. Emphasis is on aircraft and system approaches not covered by existing programs of record; including innovative fused-sensor missile warning, advanced decoys, and preemptive countermeasures systems.
3. Emerging commercially derived technologies; including rapid prototyping of those required to combat adaptive threats in the GWOT including, initially small 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:

Accomplishments/Planned Program Title:

FY 2007

FY 2008

FY 2009

Ground Based Counter-ManPADS:

5.517

3.685

1.300

FY 2007/2008/2009 Plans: This project integrates netted, ground-based, Infrared (IR) sensor technologies. 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, Man Portable Air Defense Systems (ManPADS) known to be in the hands of terrorists in Iraq and elsewhere. Previously, thermal signature data was collected on a representative set of fixed-wing commercial aircraft suitable for Civil Reserve Air Fleet 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 150 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 resultant products of these prior efforts have 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 subsequently been requested for use by United States (U.S.) allies and airline officials alike; a proven, three-element IR sensor array whose demonstrated performance in a three-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 FY 2007. FY 2008 efforts will complete the assessment of this system in combination with other, available ground-based ManPADS defeat devices and will document performance characteristics for consideration by force protection planners, integrated military base defense experts, and homeland defense officials. FY 2008-2009 will also test and measure this system for its ability to detect, warn and track other threats such as aircraft, cruise missiles, and Unmanned Aerial Vehicles (UAVs) whose signatures represent a difficult challenge for many conventional weapons systems.

Accomplishments/Planned Program Title:

FY 2007

FY 2008

FY 2009

Low Cost/Near Term Counter-ManPADS:

2.256

6.273

3.500

FY 2007/2008/2009 Plans: This project extends FY 2007 efforts to determine the feasibility of substantially improving the protection of air platforms by combining ground-based detection with airborne pyrophoric countermeasures. FY 2007 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. In FY 2008-2009, PE 0603618D8Z will leverage platform funding advance this ground-based sensor project to demonstrate a tactical data link on UH-1/AH-1 platforms of ManPADS detection, tracking, warning and engagement under all-aspect launch conditions and will complete the ground-based laboratory and flight demonstration of the integrated system and countermeasures called Aircraft ManPADS Protection System (AMPS).

Air platform protection can also be 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 U.S. and coalition forces are adversely affected by the large number of background events radiating in the ultraviolet spectrum and the average response recovery time of sensors exposed to high-intensity flares at short range. 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. FY 2008 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 2008 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 and development of an IR countermeasures database will be funded from this project in FY 2008-2009.

Accomplishments/Planned Program Title:

FY 2007

FY 2008

FY 2009

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PROJECT
P619

Disruptive Technology Defeat:

2.919

2.353

4.520

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 organizations on an adversarial footing with the United States (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 small Unmanned Aerial Vehicles (UAVs) quickly proliferating to terror organizations. 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 United States Air Force 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 United States Northern Command (USNORTHCOM) and Defense Intelligence Agency (DIA). The events will 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 USNORTHCOM arrange for a variety of U.S. defense systems to be demonstrated and evaluated in the May 2008 timeframe. FY 2009 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 for this item.

D. Acquisition Strategy Not applicable for this item.

E. Major Performers Not applicable for this item.