ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE
3 - Advanced technology development	**0603270A - EW TECHNOLOGY**

COST (In Thousands)		FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
Total Program Element (PE) Cost		36347	22280	18612	18857	18898	19402	18780
K12	EW Demonstrations (CA)	8912	9661	0	0	0	0	0
K15	ADVANCED COMM ECM DEMO	2840	8068	9425	9468	9373	9451	9542
K16	NON-COMMO ECM TECH DEM	21242	4551	9187	9389	9525	9951	9238
K19	MULTIPLE INTEL REMOTED SENSOR SYSTEM - Blk 1	957	0	0	0	0	0	0
K20	SHORTSTOP	2396	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This Program Element (PE) matures and demonstrates electronic warfare (EW) survivability and combat identification systems to significantly enhance the survivability, lethality and ability to conduct offensive operations to win the information war for the Future Force and, where feasible, exploits opportunities to enhance Current Force capabilities. It addresses the need to locate, disrupt or destroy the enemy's Command, Control, and Communications (C3) systems and infrastructure, tactical radar surveillance and radio frequency (RF)/infrared (IR)/electro-optical (EO) homing, guided and directed munitions and missile systems. Communications countermeasures (CM) and communications counter-countermeasures (CCM) applications are matured to deny the enemy the use of their sensors while protecting sensors from enemy deception and jamming. Project K15, The Advanced Communications Electronic Countermeasures (ECM), provides technology demonstrations in CM, information collection and reporting to transition to Army intelligence and electronic warfare (IEW) systems. Project K16, Non-communication ECM Technology Demonstration, focuses on the feasibility and effectiveness of non-communications ECM and electronic support/electronic intelligence. This project provides self-protection from radar, (EO), and (IR) guided anti-aircraft artillery, surface-to-surface missiles, artillery, and top attack weapons. Further, it provides precise targeting information on non-communications emitters. Deception and jamming of the enemy through long range netted sensor webs will assist in neutralizing the enemy's ability to see, understand, decide and shoot first. RF based detection and jamming techniques will be matured, in coordination with on-going IR sensor research, to protect ground forces against command and sensor-initiated booby trap improvised explosive devices (IEDs). Efforts in this PE are coordinated with PE 0603313 (Missile and Rocket Advanced Technology) and PE 0603003A (Aviation Advanced Technology), PE 0602270 (EW Techniques), PE 0602120 (Sensors and Electronic Survivability), and PE 0603772 (Advanced Tactical Computer Science). Projects K12, K19 and K20 fund Congressional special interest efforts.

The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this PE contains no duplication with any effort within the Military Departments and is fully coordinated with PE 0602270A (EW Technology). Work in this PE is performed by the Army Research, Development and Engineering Command, Communications-Electronics Research, Development, and Engineering Center, Fort Monmouth, NJ.

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B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2006)	21357	16801	17940
Current BES/President's Budget (FY 2007)	36347	22280	18612
Total Adjustments	14990	5479	672
Congressional Program Reductions		-4097	
Congressional Rescissions		-224	
Congressional Increases		9800	
Reprogrammings	14990		
SBIR/STTR Transfer			
Adjustments to Budget Years			672

FY05 increase of $15.0 million due to reprogramming of WARLOCK funding from OSD Iraqi Freedon Fund.

Five FY06 Congressional adds totaling $9800 were added to this PE.

FY06 Congressional adds with no R-2A (appropriated amount is shown):
($2000) Aerial Canopy MASINT Sensor (ACMS)
($1000) GeoFence Pipeline Monitoring and Safety Project
($2200) Portable, Level I Fusion Toolset
($1400) Short Range Electronic Detection (SHRED)
($3200) US Army Future Force ELINT

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2006

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603270A - EW TECHNOLOGY**	**K15**

COST (In Thousands)	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
K15 ADVANCED COMM ECM DEMO	2840	8068	9425	9468	9373	9451	9542

A. Mission Description and Budget Item Justification: This project matures and demonstrates the ability to locate and identify modern tactical battlefield enemy and blue force radio frequency (RF) communications and radars for the Future Force to conduct uninterrupted air and ground based intelligence collection and long range targeting operations in a hostile electromagnetic environment. This project provides flexible, modern systems to achieve information dominance, protect the force, and shape the battlespace. Electronic Support for the Future Force (ESFF) will provide lightweight, low cost Unmanned Aerial Vehicle (UAV) and Unattended Ground Sensors (UGS) Electronic Support Measures (ESM) to detect and locate modern signals of interest. Information Operations investigates, researches, and demonstrates communications countermeasures (CM) and counter-countermeasures (CCM) technologies to first intercept, identify, and locate tactical communications and then manipulate threat computer networks and their components.

The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this project is performed by the Army Research, Development and Engineering Command, Communications-Electronics Research, Development, and Engineering Center, Ft. Monmouth NJ.

Accomplishments/Planned Program	FY 2005	FY 2006	FY 2007
- Electronic Support for the Future Force (ESFF): This effort matures and demonstrates technologies that enable tactical signal intercept and jamming. In FY05, performed lab and field test of the networked radio frequency (RF) ESM sensor architecture for unmanned ground and air vehicle applications for the Brigade Combat Team (BCT); integrated and demonstrated unattended ground and air RF ESM sensors with the network radio links matured by the Networked Sensors for the Future Force Advanced Technology Demonstration program. In FY06, test UAV and UGS ESM in a warfighter operational environment that demonstrates real time collection, ID and location with sensor data fusion. In FY07, will test ESM systems in UAV and UGS in high emitter density suburban and urban environments; will transition ESM to Tactical Signals Intelligence Payload and the Future Combat System BCT.	2500	4000	4500
- Information Operations: In FY05, identified and tested techniques to cross cue/correlate geolocation and virtual address locations in a lab environment; refined techniques for signal detection, identification, location and isolation against representative targets and demonstrated a hardware suite capable of hosting these techniques. In FY06, mature situational awareness algorithms, traffic analysis algorithms, and electronic attack capabilities for signals of interest; mature and demonstrate adaptive array processor for geolocation of signals of interest. In FY07, will refine concept of operations and tactics, techniques and procedures for system implementation with users at the Battle Labs; will continue development of adaptive array processor to counter problems associated with multipath, co-channel and co-site interference, and to provide a precise signal geolocation capability; will leverage broadband antenna work performed under the Tactical SIGINT Technology program, and develop information operation algorithms to provide the capability to influence a potential target's plan of action; will develop software algorithms to map present communications architecture in areas of interest, and perform analysis to determine the optimal network based attack schema. Work on this effort is also being accomplished under PE 62270 Project 906.	340	4068	4925
Total	2840	8068	9425

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603270A - EW TECHNOLOGY**	**K16**

COST (In Thousands)		FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
K16	NON-COMMO ECM TECH DEM	21242	4551	9187	9389	9525	9951	9238

A. Mission Description and Budget Item Justification: This project matures and demonstrates the Future Force non-communication, multi-functional electronic warfare capability to enhance the survivability of aviation platforms, ground combat vehicles and the dismounted forces. The survivability approach will provide detection avoidance through situational awareness and identification technologies, signature management, hit avoidance using warning receivers, and electronic countermeasures. This project demonstrates recent advances in radio frequency (RF), infrared (IR) and electro-optical (EO) sensor and jamming sources to detect, locate, deceive and jam booby traps, radar directed target acquisition systems, target-tracking sensors, surface-to-air missiles (SAMs), air-to-air missiles (AAMs), top attack and electronically fuzed munitions. The ability to neutralize booby traps will be matured and demonstrated by embedding the maximum capability in projected Brigade Combat Team (BCT)/Future Force systems to minimize vehicle weight, cost, logistics and fielding. Additionally, this project will demonstrate EO technologies and countermeasure technologies against laser-aided and electro-optically directed gun or missile systems. This project also demonstrates Electronic Support (ES) technologies used against communications and non-communications signals for targeting and tactical Situation Awareness (SA). Efforts are focused on detecting, identifying and geolocating emitters of interest from an effective standoff distance and providing near real-time SA updates to the BCT commander.

The cited work is consistent with Strategic Planning Guidance, the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan, and the Defense Technology Area Plan (DTAP). Work in this project is performed by the Army Research, Development and Engineering Command, Communications-Electronic Research, Development, and Engineering Center, Ft. Monmouth NJ, and the Army Research Lab, Adelphi MD.

Accomplishments/Planned Program	FY 2005	FY 2006	FY 2007
- Reconnaissance and Defeat of Improvised Explosive Devices: This effort matures and demonstrates an organic, multifunctional on the move force protection capability that will detect and neutralize enemy sensors, communications, and remotely controlled (RC) weapons data links, providing a level of survivability to dismounted, light and medium forces not currently available. In FY05, matured electronic countermeasures (ECM) techniques, using receivers, antennas and jamming sources in a laboratory environment; refined ECM techniques and conducted field-testing of algorithms and radio frequency receivers against weapon control links to neutralize remote controlled weapons. In FY06, investigate the effects of radio frequency (RF) energy on electronic triggers for RC and non RC IEDs and measure the power/modulation required to dud or otherwise neutralize selected devices; develop power/energy requirements for IED neutralization concepts and design parameters. In FY07, will demonstrate hardware incorporating unique waveforms, antenna, high sensitivity receiver, and high power transmitter. Work on this effort is also being accomplished under PE/Project: 62270/442; 62270/906.	1976	2330	2065
- Integrated Survivability and Cueing Sensor: This effort matures and demonstrates technologies that enhance vehicle system survivability. In FY05, demonstrated added capability to missile warning sensors; matured hardware modules and software algorithms to enable ultra-violet and infra-red missile warning sensors to detect muzzle flash from small arms. In FY07, will mature focal plan arrays, algorithms, and signal processing; will perform live-fire test of prototype warning and cueing sensors and systems; will select one system based on test results. Work on this effort is also being accomplished under PE/Project: 62270/442; 62120/H15; 63772/243.	2266	0	2000
- Combat Identification Technologies: In FY06, mature custom application specific integrated circuits (ASICs) for Millimetter Wave	0	1434	1119

(mmW) ID functionality; demonstrate tools for determining cost effectiveness of combat identification (CID) capabilities; mature modeling and simulation of CID concepts. In FY07, will design and fabricate Geometric Pairing (GP) and RF Tag hardware embedded into Ground Soldier System ensembles to demonstrate dismounted integration concepts and technical performance characteristics; will conduct first technical testing of GP situation awareness and RF Tag concepts and complete inserting mmW ID functionality into custom ASICs.			
- Hostile Fire Indication (HFI) and Countermeasure (CM): Program will implement affordable hostile fire indication for aircraft against small arms fire and rocket propelled grenades (RPG) by modifying currently fielded systems. In FY06, initiate modeling and simulation for tactics, techniques and procedures development, follow UK lead program to modify Common Missile Warning System processor to enable small arms detection. In FY07, will investigate RPG detection and warning software modifications to APR-39A(V)1 to display HFI warning and conduct additional firing data collection as needed; will mature modeling and simulation of sensor and threats; will leverage UK/USAF/NVESD optical CM for small arms and RPGs.	0	787	4003
- Fusion Based Knowledge for the Future Force: In FY05, identified requirements and developed a plan for integrating supporting software such as that for terrain reasoning and modeling and simulation with software being developed to retrieve data and to perform fusion.	2000	0	0
- WARLOCK: This one year reprogramming from the Iraq Freedom Fund funded a focused development effort to counter improvised explosive devices. Specifically, it funded resource analysis of waveform technique generation, full spectrum antenna development, frequency de-confliction with Blue Force communication devices and electronic systems; the incorporation and interface with Global Positioning System (GPS) timing protocols and associated software development, and field testing of the improved counter explosive devices. This effort is executed by PEO IEWS.	15000	0	0
Total	21242	4551	9187