ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2005

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

	COST (In Thousands)	FY 2004 Actual	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	26117	21357	16801	17940	18607	18642	19139	18522
K12	EW DEMONSTRATIONS (CA)	4282	8916	0	0	0	0	0	0
K15	ADVANCED COMM ECM DEMO	4715	2841	8184	9084	9342	9245	9322	9410
K16	NON-COMMO ECM TECH DEM	7390	6245	8617	8856	9265	9397	9817	9112
K19	MULTIPLE INTEL REMOTED SENSOR SYSTEM - BLK 1	4865	958	0	0	0	0	0	0
K20	SHORTSTOP	4865	2397	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: This Program Element (PE) matures and demonstrates multi-intelligence remote sensor technologies and electronic warfare (EW) survivability 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 US Army 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. This project also supports demonstrations of automatic/automated fusion of intelligence, information, and data from multiple sources to provide unit of action/unit of employment common operating picture (COP). 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). Survivability efforts in this PE are coordinated with PE 0603313 (Missile and Rocket Advanced Technology) and PE 0603003A (Aviation Advanced Technology). 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.

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2005)	9382	17473	18504
Current Budget (FY 2006/2007 PB)	21357	16801	17940
Total Adjustments	11975	-672	-564
Net of Program/Database Changes			
Congressional Program Reductions	-313		
Congressional Rescissions			
Congressional Increases	12800		
Reprogrammings			
SBIR/STTR Transfer	-512		
Adjustments to Budget Years		-672	-564

Change Summary Explanation:

Six FY05 Congressional adds totaling $12800 were added to this PE.

FY05 Congressional Adds with no R-2A:
($1391) Aerial Canopy Sensor Delivery System (ACSDS) Project K12: The purpose of this one year congressional add is to develop a air deliverable remote monitoring system that supports enhanced intelligence gathering, information exfiltration in a jungle environment. No additional funding is required to complete this project.

($959) Ground Combat Vehicle Laser Warning, Project K12: The purpose of this one year Congressional add is for ground vehicle laser warning system demonstration for Future Combat Systems applications. No additional funding is required to complete this project.

($958) Multifunction Intelligence and Remote Sensor System Advanced Technology, Project K19: The purpose of this one year Congressional add is to mature power management techniques/algorithms for ground sensors and mature techniques for Low Probability of Intercept/Low Probability of Detection communications. No additional funding is required to complete this project.

($2877) Portable Level I Fusion Tool Set, Project K12: The purpose of this one year Congressional add is for development of a Measurement and Signature Intelligence tool kit supporting Improvised Explosive Devices and Rocket Propelled Grenade exploitation. No additional funding is required to complete this project.

($2398) Shortstop Electronic Protection System, Project K20: The purpose of this one year Congressional add is to demonstrate advanced countermeasure techniques for selected disruption and usage denial of sophisticated booby traps. No additional funding is required to complete this project.

($3692) US Army Tactical ELINT for Ground Maneuver Forces, Project K12: The purpose of this one year Congressional add is to mature the application of specific emitter identification techniques to evolving Army ELINT mission requirements by porting existing algorithms to hardware and field testing to verify performance. No additional funding is required to complete this project.

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February 2005

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

COST (In Thousands)		FY 2004 Actual	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	4715	2841	8184	9084	9342	9245	9322	9410

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 2004	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 FY04, provided advanced simulation capability of Electronic Support Measure (ESM) sensors and integrated it into the Mounted Maneuver Battlespace Lab at Ft. Knox to evaluate tactics and tactical Internet throughput requirements to supporting networked, unattended radio frequency sensors for the Unit of Action (UA). In FY05, perform lab and field test of the networked radio frequency (RF) ESM sensor architecture for unmanned ground and air vehicle applications for the UA; integrate and demonstrate 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 and other UA efforts. In FY06, will 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 UAV and UGS as integrated Electronic Support (ES) system in high emitter density suburban and urban environments; will transition ESM to Tactical Signals Intelligence Payload and Future Combat Systems.	970	2500	4000	4500
- Information Operations: In FY05, identify and test techniques to cross cue/correlate geolocation and virtual address locations in a lab environment; refine techniques for signal detection, identification, location and isolation against representative targets and demonstrate a hardware suite capable of hosting these techniques. In FY06 will integrate initial set of techniques into hardware suite and test at the component level and assess performance against previously collected field data. In FY07, will mature existing techniques and integrate remaining techniques into objective hardware suite; will test as an end-to-end capability in the laboratory/chamber environment against representative targets, and conduct a demonstration of an integrated capability in an operationally relevant environment.	0	341	4184	4584
- Single Integrated Ground Picture (SIGP): SIGP is the ground component of the Joint Battle Management Command and Control (JBMC2) capability initiative providing enhanced Situational Awareness that enables precise and decisive command & control in the Battlespace. In FY04, researched what is being done to build, coordinate, and ensure joint and coalition data and information interoperability/availability across the Battlespace; baselined current warfighter capabilities to access, fuse, and filter information from multiple sources; performed operational and systems engineering analysis to identify information interoperability gaps; established Joint standards, architectures, and system requirements for Current/Future Force capabilities based on lessons learned, emerging Joint operational concepts (OPCONs) and concepts of operation (CONOPS).	3745	0	0	0

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Totals	4715	2841	8184	9084

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February 2005

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

COST (In Thousands)		FY 2004 Actual	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	7390	6245	8617	8856	9265	9397	9817	9112

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 signature management and 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 Future Combat Systems (FCS)/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 those 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 Unit of Action 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 2004	FY 2005	FY 2006	FY 2007
- Sensor Countermeasures for the Future Force: 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 weapons data links, providing a level of survivability to dismounted, light and medium forces not currently available. In FY04, matured and demonstrated an Electronic Counter Measure (ECM) capable of neutralizing booby-traps; transitioned this capability to PM Electronic Countermeasures for immediate fielding to US troops. In FY05, mature ECM techniques, using receivers, antennas and jamming sources in a laboratory environment; refine ECM techniques and conduct field-testing of algorithms and radio frequency receivers against weapon control links to neutralize remote controlled weapons. In FY06, will demonstrate capability to detect, locate and jam enemy netted sensors; demonstrate countermeasures against multi-spectral sensor networks to include radio frequency (RF), electro-optical (EO), acoustic and magnetic sensors.	2990	1979	6617	0
- Integrated Countermeasures and Integrated Survivability: This effort matures and demonstrates technologies that enhance vehicle system survivability. In FY04, integrated and demonstrated an early version breadboard 160x160 array, two color (red and blue) uncooled mid-wave infrared (IR) ground vehicle missile-warning sensor system with detection/tracking algorithms; supported TARDEC's Integrated Army Active Protection System on-the-move demo; conducted initial tech assessment of Ultraviolet (UV) missile warning sensor for ground based application. In FY05, demonstrate added capability to missile warning sensors; mature hardware modules and software algorithms to enable UV and IR missile warning sensors to detect muzzle flash from small arms.	3200	2266	0	0
- Fusion Based Knowledge for the Future Force (FBKFF): In FY04, investigated requirements for an analyst-computer interface system based on cognitive task analyses done with Army Military Intelligence analysts. In FY05, identify requirements and develop 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. In FY06, will integrate software elements for answering commanders' intelligence requirements & conduct experiments. In FY07 will demonstrate additional data sources, supporting software, and applications into the system; will conduct experiments to evaluate fully integrated set of software assets to assess their utility in reducing the information overload of reports that analysts will need to analyze and interpret to provide adequately fast and high quality answers for the commander's priority intelligence requirements in the Future Force's UA.	500	2000	2000	3000

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
- Tactical Wireless Network: In FY04, provided simulated intruder attacks to test Network Assurance mechanism being matured to protect mobile ad hoc wireless systems and networks; attempted to exploit weaknesses in mobile ad hoc wireless protocols and test Wireless Intrusion Detection efforts; performed laboratory and field-testing of security policy management software that receives security alerts from intrusion detection sensors and attempts to redefine network security policy to counteract.	700	0	0	0
- Common Air/Ground Electronic Combat Suite: This effort matures and demonstrates technologies to increase the survivability of air and ground platforms. A common set of warning sensors and electronic countermeasures will be demonstrated in an airborne as well as ground environment. In FY07, will mature a multiband, solid state laser for electronic countermeasure applications; will investigate small solid state radio frequency (RF) modules to jam anti-aircraft radar systems, top attack munitions, RF fuzed artillery, low probability of intercept radar systems and remotely detonated booby traps.	0	0	0	5856
Totals	7390	6245	8617	8856