ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2004

BUDGET ACTIVITY
3 - Advanced technology development

PE NUMBER AND TITLE
0603270A - EW TECHNOLOGY

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
Total Program Element (PE) Cost		18566	25360	9382	17473	18504	18705	18891
K12	EW DEMONSTRATIONS (CA)	1905	4347	0	0	0	0	0
K15	ADVANCED COMM ECM DEMO	3080	4794	2906	8511	9370	9391	9368
K16	NON-COMMO ECM TECH DEM	7485	6341	6476	8962	9134	9314	9523
K19	MULTIPLE INTEL REMOTED SENSOR SYSTEM - BLK 1	6096	4939	0	0	0	0	0
K20	SHORTSTOP	0	4939	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. The advanced communications Electronic Countermeasures (ECM) K15 project 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). The Non-communication ECM technology demonstration project (K16) 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. Technologies matured as part of this PE will be demonstrated in the integrated situation awareness (SA) and targeting advanced technology demonstration (ATD), and the integrated counter measures platform survivability effort. 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).

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 is provided by the Communications-Electronics Research, Development, and Engineering Center, Fort Monmouth, NJ.

B. Program Change Summary	FY 2003	FY 2004	FY 2005
Previous President's Budget (FY 2004)	18756	11273	9213
Current Budget (FY 2005 PB)	18566	25360	9382
Total Adjustments	-190	14087	169
Congressional program reductions		-217	
Congressional rescissions			
Congressional increases		14400	
Reprogrammings	-190	-96	
SBIR/STTR Transfer			
Adjustments to Budget Years			169

Change Summary Explanation: Funding - FY 2004: Five FY04 Congressional Adds totaling $14400 were added to this PE.

FY04 Congressional Adds with no R-2As:

($960) AN/VVR-1 Laser Warning Receiver, Project K12: The purpose of this one year Congressional add is to complete the qualification of the AN/VVR-3, procure prototype systems and perform a demonstration on a combat vehicle. No additional funds are required to complete this project.

($4795) Multifunction Intelligence and Remote Sensor System, Project K19: The purpose of this one year Congressional add is to add air delivery capability and automatic detect, track, classify, and locate functions, incorporate power management algorithms, and investigate application of sensor technology to unmanned ground vehicles. No additional funds are required to complete this project.

($4795) Shortstop Electronic Protection System, Project K20: The purpose of this one year Congressional add is to perform threat analysis, architecture analysis, prototype hardware and software development, implementation, and test/evaluation to expand the Shortstop Electronic Protection System technology, capability and performance to include the selective disruption and usage denial of modern communication devices, in specific environments for specific duration. No additional funds are required to complete this project.

($2301) US Army Tactical ELINT for Ground Maneuver Forces, Project K12: The purpose of this one year Congressional add is to investigate

application of specific emitter identification techniques to evolving Army ELINT mission requirements. No additional funds are required to complete this project.

($959) WX Intelligence Sensor System, Project K12: The purpose of this one year Congressional add is to investigate, mature, and rapidly prototype a demonstration system for an unattended, localized weather sensor system that will be network compatible with Remote Sensor Systems (Silent Warrior). No additional funds are required to complete this project.

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

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
K15	ADVANCED COMM ECM DEMO	3080	4794	2906	8511	9370	9391	9368

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. The goal of the Warfighter Electronic Collection and Mapping program is to provide the warfighter at the unit level with the ability to locate enemy tactical radio RF emitters. Electronic Support for the Future Force (ESFF) will provide lightweight, low cost UAV and Unattended Ground Sensors (UGS) Electronic Support Measures (ESM) to detect and locate modern signals of interest. The Joint Intelligence, Surveillance, and Reconnaissance (JISR) Advanced Concept Technology Demonstration (ACTD) provides the tools that allow the warfighter, at all echelons, a comprehensive near-real time view of ISR information based on both traditional and selected non-traditional sensors to enhance situation awareness. Information Operations for the Future Force 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 PE is performed by the Communications-Electronics Research, Development, and Engineering Center, Ft. Monmouth, NJ.

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
- Information Operations for the Future Force (IOFF): In FY05, will identify and test techniques to cross cue/correlate geolocations and Internet Protocol (IP) virtual address locations in a lab environment. Will refine precision direction finding capability to determine 3-D coordinates of potential targets.	0	0	336
- JISR ACTD: In FY03, integrated advanced intelligence web applications into existing brigade intelligence systems to enhance situation awareness by ultimately increasing sensor feeds, timeliness, and number of users accessing shared data. Demonstrated initial operational capability and participated in two field exercises. Other work related to this project is performed under project K16.	2390	0	0

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
- Warfighter Electronic Collection and Mapping and Electronic Support for the Future Force: This effort matures and demonstrates technologies that enable tactical signal intercept and jamming. In FY03, integrated warfighter RF collection system co-resident algorithms on Small Unit Operations (SUO) radio platform to enable SUO radios to perform RF collection. In FY04, provide advanced simulation capability of Electronic Support Measure (ESM) sensors and integrate to the Mounted Maneuver Battlespace Lab at Ft. Knox to evaluate tactics and tactical Internet throughput requirements to support networked, unattended radio frequency sensors for Future Combat Systems. In FY05, will perform lab and field test for networked radio frequency (RF) ESM sensor architecture for unmanned ground and air vehicle applications for Future Combat Systems. Will integrate and demonstrate unattended ground and air RF ESM sensors with the network radio links matured by the Networked Sensors for the Future Force (NSFF) Advanced Technology Demonstration program and other future combat system (FCS) efforts. Will integrate software in model of Information Operations systems, test wired and wireless detection and recognition algorithms for correlation of virtual addresses and real locations. Related work is performed under project K16.	690	972	2570
- Single Integrated Ground Picture (SIGP): SIGP is the ground component of the Joint Battle Management Command and Control (JBMC2) capability initiative that provides enhanced Situational Awareness enabling precise and decisive command & control in the Battlespace. In FY04, research what is currently being done to build, coordinate, and ensure joint and coalition data and information interoperability across the battlefield. Baseline current warfighter capabilities to access, fuse, and filter information from multiple sources. Perform operational and systems engineering analysis to identify information interoperability gaps then develop joint standards, architectures, and system requirements for Current and Future Force capabilities based on lessons learned and emerging Joint operational concepts (OPCONs) and concepts of operation (CONOPS).	0	3744	0
Small Business Innovative Research/Small Business Technology Transfer Programs	0	78	0
Totals	3080	4794	2906

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

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
K16	NON-COMMO ECM TECH DEM	7485	6341	6476	8962	9134	9314	9523

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 ground combat vehicles and the dismounted forces. The vehicle survivability approach will provide detection avoidance through signature management and hit avoidance using warning receivers and 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 fuzed munitions. The ability to neutralize booby trap improvised explosive devices (IEDs) will be matured and demonstrated by embedding the maximum capability in projected 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 demonstrate 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 to support a "see first, understand first, act first, finish decisively" standard. The Warfighter Electronic Collection and Mapping (WECM) program provides the capability at the unit level to locate enemy tactical RF emitters. This will employ non-traditional uses of software-defined radios to perform tactical, short-range detection of threat emission. The Joint Intelligence, Surveillance, and Reconnaissance (JISR) ACTD will provide the tools that allow the warfighter, at all echelons, a comprehensive near-real time view of ISR information based on both traditional and selected non-traditional sensors to enhance situation awareness.

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 is performed the Communications-Electronics Research, Development, and Engineering Center, Ft. Monmouth, NJ and the Army Research Lab, Adelphi MD.

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
- 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, conduct modeling and simulations in support of deception and jamming technique development. Develop and test prototype hardware and software against remote controlled weapons. In FY05, develop Electronic Counter Measure (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.	0	2981	1960
- Integrated Countermeasures and Integrated Survivability: This effort matures and demonstrates technologies that enhance vehicle system survivability. In FY03, performed antitank guided missile (ATGM), surface-to-air missile and anti-aircraft artillery countermeasure modeling and simulation. In FY04, integrate two color uncooled mid-Infrared (IR) ground vehicle missile-warning sensors with IR jammers for use against ATGMs. In FY05, will conduct live fire demonstrations of missile warning and IR countermeasures on a moving platform. Demonstrate timely and accurate handoff of information to cue active protection system.	2590	1987	2516
- JISR ACTD: This effort matures and demonstrates technologies that enable the networked information operations with joint intelligence, surveillance, reconnaissance, and intercept. In FY03, demonstrated in a field test, RF collection system on surrogate RF radio platform to detect and geolocate enemy's close battle, low power tactical communications. Demonstrated electronic mapping for Brigade and above early entry forces. Demonstrated ability of radios to network and pass threat situation awareness information to Battle Command Brigade and Below and JISR in less than two minutes. Performed final experiment to demonstrate data correlation, cueing, complete mission planning, and analysis tools. Correlated imagery intelligence, human intelligence, and signals intelligence into human centered decision-making formats that could be quickly used at levels from combat vehicle to division commander. Transitioned to PM Prophet and PM ACS.	1074	0	0
- Fusion Based Knowledge for the Future Force (FBKFF): In FY04, develop level 2 and 3 fusion tools to understand enemy intent and prepare Course of Action plan. Integrate the Topographic Engineering Center's Battlespace Terrain Reasoning and Awareness module into the fusion tools. Evaluate concepts for a Physical Damage Assessment (PDA) experiment with automated planning tools. In FY05, will continue development of Knowledge infrastructure. Will build and demonstrate in a pilot experiment a PDA module to assess PDA/Battle Damage Assessment tools.	0	500	2000

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
- Tactical Wireless Network: In FY04, provide simulated intruder attacks to test Network Assurance mechanism being matured to protect mobile wireless systems and networks. Attempt to exploit weaknesses in mobile wireless protocols and test Wireless Intrusion Detection efforts.	0	720	0
- Warfighter Electronic Collection and Mapping: In FY03, performed field test for networked RF collection capabilities as an embedded function in the SUO radio. Performed lab test for the system architecture's ability to detect, identify, and locate enemy tactical radios with a CEP of 200m or better to support the Objective Force Warfighter. Refined and optimized software algorithms to exploit enemy RF transmissions that represented threats to Future Combat Systems vehicles. Other work related to this project was performed under project K15.	3821	0	0
Small Business Innovative Research/Small Business Technology Transfer Programs	0	153	0
Totals	7485	6341	6476