ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2005

BUDGET ACTIVITY
3 - Advanced technology development

PE NUMBER AND TITLE
0603710A - NIGHT VISION ADVANCED 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	82687	102047	51761	49341	42638	43097	49173	49622
590	OVERWATCH ACTD	1791	5542	1350	492	0	0	0	0
C65	DC65	9043	5703	6174	4500	3360	3434	3502	3572
K70	NIGHT VISION ADV TECH	26905	19185	22521	23464	27511	27354	29290	29550
K73	NIGHT VISION SENSOR DEMONSTRATIONS (CA)	37020	54020	0	0	0	0	0	0
K86	NIGHT VISION, ABN SYS	7928	17597	21716	20885	11767	12309	16381	16500

A. Mission Description and Budget Item Justification: This Program Element (PE) matures and demonstrates critical sensor technology that will provide the Army with the capability for reconnaissance, surveillance, and target acquisition beyond today's tactical lines-of-sight and enhance the Army's ability to operate in all battlefield conditions. Major efforts within this PE are designed to increase survivability and lethality by providing capabilities to acquire, engage, and destroy targets at longer ranges in complex environments and conditions (e.g. day/night, obscured, smoke, adverse weather) in support of Future Combat Systems (FCS), Future Force, and where feasible, exploit opportunities to enhance Current Force capabilities. Project 590 focuses on assessing the military utility and maturing concepts of operation to address counter ambush operations. Project C65 funds classified efforts. Project K70 funds efforts related to night vision advanced technologies. This project will develop a system of networked, low-cost, distributed unmanned sensors for battlefield situational awareness, and a cost effective targeting system (CETS) for autonomous target acquisition; demonstrate situational awareness for FCS infantry carriers operating in close-in complex terrain; provide the vehicle commander, crew members and dismounting infantry with an independent, simultaneous, multi-user close-hatched 360°x90° hemispherical view of the area surrounding a stationary or moving vehicle during day and night operations; demonstrate new lightweight very low-cost unattended ground sensors that will provide increased situational awareness and force protection capabilities for the FCS and future soldier systems; demonstrate mission equipment packages (MEP) for unmanned air vehicles (UAVs) that enable small, lightweight, interchangeable payloads of varying sizes to support target detection, identification, and location for the Unit of Action (UA); demonstrate the combat overmatch benefits of 3rd Gen IR technology, including benefits such as rapid wide area search, Multi-Spectral aided target detection (AiTD), difficult target detection, and passive long range target identification (ID beyond threat detection) in both an air prototype and ground test-bed while on-the-move (OTM), and will support Horizontal Technology Integration (HTI) efforts to use standard components across multiple applications for cost savings; demonstrate the technical maturity of single-color, long wave infrared (LWIR), ground based Aided Target Recognition (AiTR) algorithms and Long Range Laser Target Identification (LRTID) utilizing gated Short Wave Infrared (SWIR) components; and insert 3rd Gen IR assembly into an FCS ground based long range sensor suite; demonstrate components to improve soldier situational awareness. Project K73 funds Congressional special interest items. Project K86 funds efforts related to airborne night vision systems. This project demonstrates sensors and algorithms designed to detect mines and targets in camouflage, concealment and deception; demonstrate sensors for organic unmanned aerial vehicles for beyond-line-of-sight targeting in areas shadowed by terrain features; demonstrate imaging,

non-imaging, and active imaging sensors for Class II UAV platforms; evaluate and demonstrate improved survivability and lethality by providing ID at enemy's detection ranges; and provide pilotage and situational awareness imagery to multiple pilots/crewmenbers independently for enhanced crew/aircaraft oeprations in day/night/adverse weather conditions.

Work in this PE is related to and fully coordinated with efforts in PE 0602709A (Night Vision and Electro-Optics Technology), PE 0602270A (Electronic Warfare Technology), PE 0603774A (Night Vision Systems Advanced Development), and PE 0604710A (Night Vision Systems Engineering Development). 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). This PE adheres to Tri-Service Reliance agreements on sensors and electronic devices, with oversight, and coordination provided by the Joint Directors of Laboratories. Work in this PE is performed by the Army Research, Development and Engineering Command/Communications-Electronics Research, Development and Engineering Center/Night Vision & Electronic Sensors Directorate (NVESD), Fort Belvoir, Virginia and the Army Space and Missile Defense Command, Huntsville, Alabama (the Overwatch ACTD).

B. Program Change Summary	FY 2005	FY 2006	FY 2007
Previous President's Budget (FY 2005)	50071	60779	60493
Current Budget (FY 2006/2007 PB)	102047	51761	49341
Total Adjustments	51976	-9018	-11152
Net of Program/Database Changes			
Congressional Program Reductions	-1604		
Congressional Rescissions			
Congressional Increases	56350		
Reprogrammings			
SBIR/STTR Transfer	-2770		
Adjustments to Budget Years		-9018	-11152

Change Summary Explanation:
FY06 - Funds realigned ($9018K) to higher priority requirements.

FY07 - Funds realigned ($11152K) to higher priority requirements.

Sixteen FY05 Congressional adds totaling $56350 were added to this PE.

FY05 Congressional adds with no R-2A:
($4027) Advanced Passive Millimeter Wave Imager, Project K73: The purpose of this one year Congressional add is to mature the Millimeter Wave Imager for obstacle avoidance, landing guidance and search and rescue scenarios. No additional funding is required to complete this project.

($11988) Buster Backpack UAV, Project K73: The purpose of this one year Congressional add is to demonstrate enhanced operation and flight characteristics of the Buster Backpack UAV with advanced sensor payloads. No additional funding is required to complete this project.

($1438) Camera Assisted Monitoring System (CAMS), Project K73: The purpose of this one year Congressional add is to mature robust suites of mobile & fixed security capabilities, processes, and procedures that support the missions of DoD and other Government agencies charged with homeland security. No additional funding is required to complete this project.

($1918) Cerberus Sensor Suite Program, Project K73: The purpose of this one year Congressional add is to mature a tower-mounted sensor suite for outward looking (beyond the fence) perimeter security and intrusion detection, employing multiple detection and assessment technologies for a variety of terrain applications. No additional funding is required to complete this project.

($2302) Cost Effective Targeting System (CETS), Project K73: The purpose of this one year Congressional add is to mature CETS for integration into the Stryker vehicle, and demonstrate the operational utility of CETS to provide fully autonomous target detection, tracking and cueing. No additional funding is required to complete this project.

($3165) IED Locating Low-Cost, Long Endurance UAVs, Project K73: The purpose of this one year Congressional add is to mature sensors and related payload capabilities to increase the ScanEagle Unmanned Aerial Vehicle's (UAV) ability to detect Improvised Explosive Devices (IED) placed alongside roads. No additional funding is required to complete this project.

($1343) Mobile Chemical Agent Detector (MCAD) for Tactical Unmanned Aerial Vehicle (TUAV), Project K73: The purpose of this one year Congressional add is to mature a compact airworthy standoff chemical agent detector for TUAVs. No additional funding is needed to complete this project.

($959) Multi-Color, Multi-Function Focal Plane Array for Targeting and Fire Control, Project K73: The purpose of this one year Congressional add is to mature a large format third generation Dual Color infrared focal plane array for target acquisition. No additional funding is required to complete this project.

($4794) Night Vision Advanced Technology (NAS project), Project K73: The purpose of this one year Congressional add is to mature the Massively Deployed Unattended Ground Sensors (MDUGS) technology into a smaller package. No additional funding is required to complete this project.

($5754) Night Vision Fusion Technology, Project K73: The purpose of this one year Congressional add is to demonstrate a digitally fused, image intensified complementary metal oxide semiconductor camera and an uncooled long wave infrared camera. No additional funding is required to complete this project.

($1438) Personal Miniature Thermal Vision System, Project K73: The purpose of this one year Congressional add is to demonstrate a Vanadium Oxide 320 x 240 miniature weapon sight as an enhancement for the Universal Soldier Sensor system. No additional funding is required to complete this project.

($8967) Sensor Technology for Force Protection, Project K73: The purpose of this one year Congressional add is to demonstrate multiple sensor modalities (Electro-Optical, Radar, Communications, etc.) integrated in a tactical package for force protection/counter terrorism capabilities. No additional funding is required to complete this project.

($959) Soldier Mobility and Rifle Targeting System (SMaRTS), Project K73: The purpose of this one year Congressional add is to mature solid-state detector arrays and electronics to provide the warfighter with improved SMaRTS sensor technology. No additional funding is required to complete this project.

($959) Virtual Event Perimeter (VEP) Digital Video Surveillance Program, Project K73: The purpose of this one year Congressional add is to demonstrate a family of scalable automated video surveillance solutions that provide event driven notifications and alerts for force augmentation. No additional funding is required to complete this project.

($2685) Warfighter/firefighter Position, Location, and Tracking Sensor, Project K73: The purpose of this one year Congressional add is to mature an afford

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603710A - NIGHT VISION ADVANCED TECHNOLOGY**	**590**

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
590 OVERWATCH ACTD	1791	5542	1350	492	0	0	0	0

A. Mission Description and Budget Item Justification: This project matures and demonstrates technology that will enable real-time detection, location, and classification of small arms, mortars, and rocket propelled grenades (RPGs) in complex terrain. This Advanced Concept Technology Demonstration (ACTD) focuses on assessing the military utility of the technologies for locating enemy activity and real-time reporting of counter targeting information, and developing concepts of operation that address mobile force protection for unit of action forces involved in operations across the spectrum of conflict, from close combat to peacekeeping operations. The ACTD will mature and integrate a sensor/processor suite containing mid-wave infrared sensor, Electro-optical infrared imaging sensor, laser rangefinder/designator on a HMMWV with the appropriate C4I interfaces to disseminate information. Final product for the ACTD is a technology demonstrator that can be used to determine operational utility and deliver system performance specifications in support of the current force, Future Combat Systems, and Future Force requirements. Work in this ACTD is performed by the Army Research, Development and Engineering Command/Space and Missile Defense Command, and the Army Communications-Electronics Research, Development and Engineering Command/Night Vision and Electronic Sensors Directorate. Other agencies participating include the Office of the Secretary of Defense, U.S. Pacific Command, and Program Executive Office Intelligence, Electronic Warfare and Sensors. 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.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Overwatch ACTD. In FY04, matured threat signature database to support real time classification algorithms for small caliber weapons; matured infrared sensor data read-out performance and integrated sensor/processor/laser rangefinder/network interfaces for initial full scale functionality test on a HMMWV. In FY05, complete real time operational software, sensor shooter interfaces and communications hardware integration; demonstrate and evaluate the sensor/processor on a HMMWV; continue hardware/software maturation and conduct initial full-scale functionality tests, including capability to respond to threats from a full 360 degree region of concern; perform major system demonstration 1 using a HMMWV platform. In FY06, will build and integrate a second, more advanced, sensor system on Unmanned Ground Vehicle and conduct major system demonstration 2. In FY07, will provide system sustainment and technical support to users.	1791	5542	1350	492
Totals	1791	5542	1350	492

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2a Exhibit)

February 2005

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603710A - NIGHT VISION ADVANCED TECHNOLOGY**	**K70**

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
K70	NIGHT VISION ADV TECH	26905	19185	22521	23464	27511	27354	29290	29550

A. Mission Description and Budget Item Justification: This project matures and demonstrates high-performance integrated sensor/multi-sensor technologies to increase target detection range, extend target identification range, and reduce target acquisition (TA) timelines for combat vehicles against threats that are beyond today's ranges or are partially obscured by terrain features. This capability, linked to the limited situational awareness from the overhead/strategic available assets, is critical to the survivability, utility, and maneuver planning of the Army's Future Combat Systems (FCS), Future Force, and where feasible, exploits opportunities to enhance Current Force capabilities. This project will demonstrate ground-based Aided Target Detection/Recognition (AiTD/AiTR) and long range laser target identification utilizing short wave infrared components integrated into a surrogate target acquisition sensor suite including gimbaled-scanned, second generation Forward Looking Infrared (FLIR), day TV and laser range finder. The Networked Sensors for the Future Force (NSfFF) effort will demonstrate beyond-line-of-sight day/night targeting and situational awareness by demonstrating sensors and software that complement higher echelon surveillance for the Future Force. The NSfFF effort will also demonstrate next-generation, distributed, Unattended Ground Sensor systems (UGS) incorporating low-power infrared imaging and robust networking/communication technologies; a Cost Effective Targeting Sensor (CETS) for unmanned targeting, a new generation of low cost distributed unmanned networked sensor systems organic to the Reconnaissance, Surveillance and Target Acquisition (RSTA) team; and remote monitoring of an area of interest out to ~10km. Head Tracked Sensor Suite (HTSS) effort will demonstrate a day/night 360 degree X 90 degree dome of situational awareness coverage, enabling connectivity with the dismounted infantry during closed hatch operations. The Distributed Aperture System (DAS) will provide situational awareness imagery independently to the commander or multiple crew members for enhanced operations in day/night/adverse weather conditions. The Disposable Sensors effort will mature and demonstrate a new class of lightweight, very low-cost, disposable UGS systems that can be remotely delivered or hand emplaced and utilize various sensor technologies (acoustics, seismic, magnetic, infrared, imaging, and electronic/radio frequency) and algorithms to improve target detection, target identification, multi-target tracking, and information management. The Third Generation Infrared (3rd Gen IR) Technology effort will demonstrate the combat overmatch benefits of 3rd Gen IR technology; rapid wide area search, Multi-Spectral AiTD, difficult target detection, and passive long range target Identification (ID beyond threat detection) in both an air prototype and ground test-bed while on-the-move and will support Horizontal Technology Integration (HTI) efforts to use standard components across multiple applications for cost savings. The Target Acquisition Sensor Suite (TASS) effort will demonstrate ground-based AiTR utilizing active short wave infrared components for long range identification. The HTI FLIR effort will mature the prototype 3rd Gen IR system components as a form/fit/function of the Future Combat Systems (FCS) Spiral Development, and long range line of sight combat vehicle sensor suites. The Soldier Mobility and Rifle Targeting System (SMaRTS) program will demonstrate technologies to improve soldier situational 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 project is performed by the Army Research, Development and Engineering Command/Communications-Electronics Research, Development and Engineering Center/Night Vision & Electronic Sensors Directorate (NVESD), Fort Belvoir, VA.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Networked Sensors for the Future Force and NCR Portal. In FY04, fabricated and installed an advanced sensor package on a small UAV, completed the cost effective targeting system (CETS) design and demonstrated critical components technology performance in relevant environments; demonstrated a robust network of Unattended Ground Sensor (UGS) nodes, and began integration of sensors into the FCS Reconnaissance Surveillance and Target Acquisition (FCS RSTA) demonstrator platform; established secure, high bandwidth network connections between the Fort Belvoir NCR Portal and TRADOC Battle Lab Collaborative Simulation Environment (BLCSE) and Army Test and Evaluation Command (ATEC) Synthetic Environments Integrated Testbed (SEIT); supported a series of technical tests that linked the Fort Belvoir NCR Portal with Redstone Technical Test Center and White Sands Missile Range as part of a SEIT demonstration of a capability to support distributed, combined live and virtual testing of Future Combat Systems technologies. In FY05, complete integration of objective sensor systems, and integrate sensor management and acoustic/seismic planning tools into surrogate FCS RSTA demonstrator platform; develop and deliver UGS algorithms to demonstrate distributed cluster management capabilities to demonstrate reduced network loading and increased power efficiency; complete CETS sensor assembly integration, integrate CETS sensor and system control software/electronics into the UGV, complete system functional/acceptance testing, and deliver system; investigate dismounted reconnaissance team command and control configuration, conduct ATD final exit criteria demonstration with user participation at Fort Knox, and finalize specifications for system transition.	16286	9002	0	0
Head Tracked Sensor Suite (HTSS). In FY04, conducted critical design review to include optimization of the sensor layout within the Wescam XM15 system gimbal; conducted sensor gimbal thermal analysis; completed through-sight situational awareness overlay simulation, integration and evaluation by Armor Center subject matter experiments; demonstrated un-stabilized functionality of the coded laser pointer for dismounted operations. In FY05, integrate situational awareness network and high performance FLIR into the HTSS, integrate HTSS onto a combat vehicle and demonstrate HTSS image fusion, coded laser pointing and situational awareness network integration, and conduct limited user test and perform analysis of results to verify operability and utility.	4362	2605	0	0

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Distributed Aperture System (DAS). In FY04, conducted initial testing and soldier orientation of prototype DAS system with daylight color cameras. In FY05, integrate uncooled long wave infrared cameras with prototype DAS system, integrate prototype DAS on a troop carrying combat vehicle, conduct safety release and technical testing, and conduct limited user evaluations. In FY06, will integrate infrared and image intensification sensors into DAS for pixel level fusion; devise initial software modifications for automatic cueing of pop-up/moving personnel targets; conduct experiments to investigate potential to assist threat warning system with uncooled thermal DAS. In FY07, will integrate DAS in troop carrying combat vehicle and conduct final DAS user experimentation.	400	600	3000	3000
Disposable Sensors. In FY04, completed imaging data collection testbed units, communications network system investigation. In FY05, complete non-imaging data collection testbed units; utilize testbed units to support development of proof-of-principle sensors and measure/predict their performance parameters; develop proof-of-principle sensor hardware and display software and utilize them to conduct tests and demonstration of system; refine system concepts and system performance specifications. In FY06, will develop breadboard prototypes and conduct tests to finalize mix of sensor modalities for non-imaging sensor; investigate techniques and designs to extend sensor mission life; develop and test improvements to communications and networking sub-system; improve performance algorithms through integration of sensor components; investigate alternative sensor employment techniques. In FY07, will complete development and fabricate reduced size, weight, and power hand-emplaced sensors with improved performance algorithms, communications, and networking; conduct tests in simulated urban and open environments, and conduct system demonstration of soldier level use in urban terrain.	2503	2802	7150	8552

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
3rd Generation Infrared Technology. In FY04, conducted initial modification of Multi Function Staring Sensor Suite (MFS3) for an early simultaneous Dual Band focal plane array (FPA) 640x480 with single F# Dewar; conducted initial design of 3rd Gen Long Range Advanced Scout Surveillance System (LRAS3) test-bed to include enhanced signal processing techniques; conducted initial 3rd Gen system and component modeling; conducted initial design of Aviation Turret for 640 x 480 FPA and enhanced signal processing techniques; conducted initial development of a common air and ground Third Generation FPA integrated detector/cooler assembly (IDCA) requirement. In FY05, complete MFS3 mod; conduct 2-band MFS3 on the move field experimentation to determine military significance and man-in-the-loop considerations; complete LRAS3 mod for Dual Band Focal Plane manufacturing (DBFM); conduct initial modification of the Aviation Turret for DBFM and enhanced signal processing techniques; continue 3rd Gen modeling; continue development of long-range air and ground Third Generation FPA Integrated Detector/Cooler Assembly (IDCA) requirements. In FY06, will complete LRAS3 mod; insert Multi-Spectral AiTD/AiTR in LRAS3 test-bed for initial field testing and experimentation; complete Airborne Control Station fabrication; complete Aviation Turret mod and install in Blackhawk; continue 3rd Gen modeling; complete development of common air and ground IDCA specifications. In FY07, will demonstrate and field test upgraded Multi-Spectral AiTD/AiTR in LRAS3 in manual slew; demonstrate Rotary Wing long range ID; flight test single color AiTR in Rotary Wing application; start integration of Aviation Turret in Fixed Wing Aircraft (UAV Class IV surrogate).	851	1874	4644	980
Target Acquisition Sensor Suite (TASS) Technology Maturity Demonstrator. In FY04, completed system modeling and design, sub-system interface definition, forward looking infrared-aided target recognition (FLIR - AiTR) interface definition, sub-system and system integration and test, vehicle integration and conducted imagery collection at Yuma Proving Grounds for training/tuning of algorithms. In FY05, conduct imagery data collection at Fort Hunter Liggett and McCoy for training/tuning of algorithms and conduct non-real time evaluation of AiTR performance against sequestered imagery sets. In FY06, will demonstrate field performance of AiTR algorithms at three test sites; demonstrate long range laser target identification capability of high powered laser-gated short wave infrared; complete final report.	2503	2302	3742	0

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
HTI FLIR for FCS. In FY06, will complete sub-system and system level interface definition and system modeling for the insertion of large format, 3rd Gen detector/dewar assembly into the aviation turret long range sensor suites, and the prototype 3rd Gen Long Range Advanced Scout Sensor Suite (LRAS3) ground platform; complete the sub-system and system interface definition for the gimbal scanned 3rd Gen LRAS3 coupled with 2-color aided target detection (AiTD) processor. In FY07, will conduct initial design modification of the aviation turret and LRAS3 ground based long range and medium range sensor suites for the upgrade to large format 3rd Gen detector/dewar; perform initial integration of the 3rd Gen LRAS3 with the 2-color AiTD processor onto the gimbal system; perform initial design of the common electronics for the Air and Ground sensors.	0	0	3485	9932
Soldier Mobility and Rifle Targeting System (SMaRTS) Demonstration. In FY06, will initiate and complete system component definition, modeling, and design for a low cost all indirect view near-IR/uncooled-IR manportable sensor. In FY07, will begin sold state detector array and fusion processing component development, and electronic architecture definition, suitable for system integration into improved situational awareness capability.	0	0	500	1000
Totals	26905	19185	22521	23464

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3 - Advanced technology development	**0603710A - NIGHT VISION ADVANCED TECHNOLOGY**	**K86**

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
K86	NIGHT VISION, ABN SYS	7928	17597	21716	20885	11767	12309	16381	16500

A. Mission Description and Budget Item Justification: This project matures and demonstrates intelligence, surveillance, reconnaissance, targeting, and pilotage technologies in support of the Army's aviation and networked systems. The goal is to provide the capability to detect and identify partially obscured targets from manned and unmanned air platforms and to perform reconnaissance, surveillance, and target acquisition (RSTA) and target designation beyond today's tactical line-of-sight. This capability is critical to the survivability of the Future Combat Systems (FCS) and Future Forces' light maneuver forces. The technology efforts focus on improved RSTA and night pilotage sensors, improvised explosive device (IED) detection, high-resolution heads-up displays, sensor fusion, and aided target recognition (AiTR) capabilities for current and future helicopters (attack, scout, cargo, and utility) and unmanned aerial vehicles (UAVs). The Hyperspectral Airborne Multi-Mission Exploitation and Reconnaissance (HAMMER) effort will conduct sensor evaluations and algorithm research to demonstrate day/night detection of mines and difficult target (e.g. camouflage, concealment and deception). The Networked Sensors for the Future Force effort will mature and demonstrate multi mission (RSTA, Countermine) day/night targeting sensors and software for small UAVs for the Future Force within a system of systems environment. Technologies to be addressed include mission planning tools and ultra-light payloads for small UAVs. The mission equipment package for the Class II UAV will mature and demonstrate small, lightweight, payloads (electro-optical/infrared, laser radar) to support target detection, identification, location, tracking and targeting of difficult targets for the Brigade Combat Team. The Third Generation Infrared Technology effort for aviation will improve survivability and lethality by providing identification at enemy's detection ranges and will support horizontal technology integration (HTI) efforts to use standard components across different applications for cost savings. The Distributed Aperture System (DAS) for aviation will provide pilotage and situational awareness imagery to multiple pilots/crewmembers independently for enhanced crew/aircraft operations in day/night/adverse weather conditions.

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/Night Vision & Electronic Sensors Directorate (NVESD), Fort Belvoir, VA.

Accomplishments/Planned Program	FY 2004	FY 2005	FY 2006	FY 2007
Hyperspectral Airborne Multi-Mission Exploitation and Reconnaissance (HAMMER) Program. In FY04, performed phenomenology analysis with long wave infrared (LWIR) data; matured countermine and camouflage, concealment and deception target exploitation algorithms. In FY05, continue development and evaluation of countermine and target exploitation algorithms and implement in real time code. In FY06, will integrate real-time processor with a LWIR hyperspectral sensor system and conduct technology demonstrations of countermine and target exploitation algorithms on an airborne platform.	950	1502	2735	0
Networked Sensors for the Future Force ATD. In FY04, completed UAV countermine payload and integrated UAV and ground based sensors, networked communications and sensor data management to demonstrate a network of distributed sensors. In FY05, conduct flight tests/demonstrations of UAV countermine payload and will demonstrate multiple UAVs as part of a networked system in an operational environment, conduct refinements based on test results, and demonstrate multiple UAVs in a final demonstration. In FY06, will conduct additional cost effective targeting system (CETS) field testing in varying environments and mature advanced digital electronic image processing technologies to improve performance.	2284	5639	1000	0
Mission Equipment Packages (MEP) for Class II Unmanned Aerial Vehicle (UAV). In FY04, completed trade studies, refined sensor concepts, and began system design for a reconnaissance, surveillance, and target acquisition (RSTA)/laser designation payload that has a payload weight less than 20 pounds for small UAVs. In FY05, complete trade studies and begin maturation of a RSTA/laser designation payload; conduct laboratory/field demonstrations of active imaging foliage penetration (FOPEN) target location technologies; and conduct studies to investigate non-imaging FOPEN techniques. In FY06, will complete RSTA/laser designation payload and integrate onto a manned testbed aircraft; demonstrate and evaluate non-imaging FOPEN approaches. In FY07, will conduct flight tests and final demonstration of RSTA/laser designation payload, begin integration onto surrogate Class II UAV and demonstrate recommended active imaging and non-imaging FOPEN system concepts.	3294	8129	10981	11757

Accomplishments/Planned Program (continued)	FY 2004	FY 2005	FY 2006	FY 2007
Third Generation Infrared Technology. In FY04, evaluated and quantified the applicability of advanced technologies based on visible, laser augmented short wave infrared (IR), mid wave (MW) IR and two-color Gen III thermal imaging for improved long range identification for rotary wing and UAV applications. In FY05, test 640x480 Gen III sensor and enhanced signal processing techniques on modified aviation turret. In FY06, will integrate 640x480 Gen III sensor into an aviation turret and install it with enhanced signal processing techniques into a testbed helicopter. In FY07, will flight test Gen III technology and analyze flight data to demonstrate feasibility of target detection and identification in two-colors; flight test a single color Aided Target Recognition (AiTR) system in a rotary wing aircraft to obtain baseline data prior to follow-on two-color AiTR flight testing and data analysis, to be conducted in the out-years.	1400	2327	7000	7838
Distributed Aperture System (DAS) for Aviation. In FY07, will evaluate potential concepts and conduct the preliminary design of an aviation DAS for pilotage based upon consolidated pilotage/situation awareness requirements for the UH-60, CH-47, AH-64, and the new Armed Reconnaissance Helicopter.	0	0	0	1290
Totals	7928	17597	21716	20885