

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)						February 2004				
BUDGET ACTIVITY 2 - Applied Research				PE NUMBER AND TITLE 0602709A - NIGHT VISION TECHNOLOGY			PROJECT H95			
COST (In Thousands)				FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
H95	NIGHT VISION & EO TECH			18707	21506	22617	24488	27166	28110	29417
<p><b><u>A. Mission Description and Budget Item Justification:</u></b> This Program Element (PE) researches, designs, and applies core night vision and electronic sensor technologies to improve the Army's capability to operate in all battlefield conditions. The technologies covered in this PE have the potential to provide the Army with new, or enhanced, capabilities to see and target farther on the battlefield, operate in obscured conditions, and maintain a higher degree of situational awareness (SA) in support of the Future Force, and, where feasible, exploits opportunities to enhance Current Force capabilities. The Disposable Sensors project, performed in concert with Army Research Laboratory (ARL), will apply industry expertise in high volume, low cost electronic components and imaging systems to explore concepts for very low cost unattended ground sensors. The Low Power Display Components program advances helmet mounted display technology to reduce power consumption by &gt;50 percent over existing helmet mounted miniature displays, enabling the warfighter to execute longer missions with less head-borne weight and logistics (battery) burden. The goal of this program is to produce miniature flat panel displays that consume less power, save weight and space, support both monochrome and full-color applications, have high-image fidelity, and integrate easily with current and next-generation sensors. The Distributed Aided Target Recognition (ATR) effort will research to dramatically reduce the time necessary to acquire targets, and collect intelligence data. Sensor models will be created to accomplish trade studies, performance predictions, and also support constructive simulation/wargaming for analysis of alternatives using the Advanced Sensor Modeling and Simulation program. In addition, this effort will focus on sensor modeling and simulation technology maturation in critical areas such as; modeling target acquisition tasks of search, detection, recognition, and identification for currently inadequate representations in military operations in urban terrain, specific targets, and moving targets; modeling representations for advanced sensor technologies. Multispectral sensor simulations will support end-to-end predictive modeling and evaluation of new technologies in a virtual environment. The Low Cost High Resolution Focal Plane Array (FPA) effort researches new infrared (IR) focal plane array technologies for both cooled, high performance IR FPAs and uncooled, low cost IR FPAs. The Lightweight Laser Designators program will provide the capability to incorporate lightweight laser designators on small unmanned aerial vehicle (UAV) and unmanned ground vehicle (UGV) platforms and portable soldier systems. The Soldier Vision System Components effort will determine the benefits of using fused long wave infrared (LWIR) and very near infrared (VNIR) imagery for the dismounted soldier in all day/night visibility conditions and research component technology for transition to the Future Force Warrior program. The Tactical Hyperspectral Sensors for the Future Force effort will leverage the Defense Advanced Research Projects Agency's (DARPA) adaptable focal plane array program on high performance tunable multiband hyperspectral sensing for integration into compact ground and air vehicles. The Signal Processing for Sensors on a Chip effort will research advanced signal processing and target recognition algorithms for sensors on a chip. Techniques to be explored include: super resolution, non-uniformity correction, image fusion, analog to digital conversion, region of interest (windowing) and motion detection all contained in a single chip electronics for both cooled and uncooled infrared. Work in this PE contains no duplication with any effort within the Military Departments and is fully coordinated with PE 0602705A (Electronics and Electronic Devices), PE 0602712A (Countermines Technology), and PE 0603710A (Night Vision Advanced Tehchnology). 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).</p>										

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BUDGET ACTIVITY  
**2 - Applied Research**

PE NUMBER AND TITLE  
**0602709A - NIGHT VISION TECHNOLOGY**

PROJECT  
**H95**

Work in this PE is performed by the Coummunications-Electronics Research, Development and Engineering Center, Night Vision & Electronic Sensors Directorate (NVESD), Fort Belvoir, VA.

<u>Accomplishments/Planned Program</u>	<u>FY 2003</u>	<u>FY 2004</u>	<u>FY 2005</u>
Disposable Sensors. During FY04, conduct design trade studies, determine initial sensor mix and study exfiltration methodologies and concept of operations tradeoffs. In FY05, will fabricate initial imaging and non-imaging breadboards, develop initial embedded signal processing and fusion methodologies, and conduct a proof of principle demonstration of early warning and rear security capabilities in urban terrain.	0	1650	1650
Soldier Vision System Components. In FY03, determined via trade studies, optimal head-mounted configurations for multispectral indirect view pixel fusion components and investigated a miniature 1280 x 1024 video-based low light level mobility sensor. Assessed pixel fusion processors with image registration, non-uniformity correction, and video optimization algorithms. In FY04, develop imaging brass board helmet mounted 1280 x 1024 image intensifier and electron bombarded video-based mobility sensor and uncooled forward looking infrared (FLIR). Develop a small pixel 1280 x1024 or larger color micro display and low power uncooled FLIR electronics. Evaluate initial pixel fusion of multisensor imagery vision board sets with low light sensor and down select the best design. In FY05, will develop 1280 x 1024 passive video-board low light sensors, miniature pixel fusion processor with advanced system control functions and low power 320 x 240 uncooled FLIR. Will develop and evaluate large format (1600 x 1200/High Definition TV) low light video sensors for phase II Objective Force Warrior transition.	1149	5240	5310
Warrior Extended Battlespace Sensors. In FY03, tested and delivered affordable infrared micro-cameras for netted micro-sensor field applications; uncooled infrared sensor materials for stable low cost infrared cameras; and acoustic and infrared image sensor fusion algorithms for positive target identification and multiple target deconfliction. Transitioned to Networked Sensors for the Future Force ATD, "smart" sensor nodes for target location & tracking utilizing acoustic, seismic & magnetic sensors; IR & visible image pointing; reporting target information and images to command and control echelon. Tested and evaluated acoustic/IR imaging fused detection & tracking algorithms and delivered very low cost IR micro-cameras based on commercial IR camera manufacturing to the Networked Sensors for the Future Force ATD.	3666	0	0

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Accomplishments/Planned Program B(continued)		FY 2003	FY 2004	FY 2005
Low Power Display Components. In FY03, evaluated full color 1280x1024 display components for see-through and high-resolution applications. Completed testing and evaluation of ambient optical-channel attenuators and color optics to enhance display performance. Transitioned 1280x1024 Active Matrix Liquid Crystal Display (AMLCD) to Comanche (flight testing began spring 2003). Transitioned 800x600 Active Matrix Organic Light Emitting Diode (AMOLED) to Land Warrior system (testing began summer 2003).		4286	0	0
Distributed Aided Target Recognition (ATR) Evaluation Center of Excellence. In FY03, completed assessment and evaluation of Multi Function Staring Sensor Suite (MFS3) ATR algorithms and hardware for FCS. In FY04, evaluate and assess automatic and aided target recognition algorithms using experimental sensor imagery obtained from field collection in multiple wavebands for evaluating 3rd generation cooled sensor algorithms designed for future FCS insertion. In FY05, will extrapolate findings and expand evaluation and assessment of ATR algorithms to accomodate a wider variety of scene, clutter and environmental conditions.		598	770	970
3rd Generation Forward Looking Infrared (FLIR) Technology. In FY03, tested and evaluated small pitch 20 micron, large 640X480 multicolor array. Tested and evaluated 3-D laser radar (LADAR) with high range resolution and multiple looks can increase probability of identification through clutter.		4948	0	0
Advanced Sensor Modeling and Simulation. In FY03, implemented "Paint the Night" image design tool onto computer hardware for static scenes. Integrated distributed networked sensor simulation capability with joint virtual battlespace (JVB) and supported TRAC FCS AoA C4ISR Experiment at Fort Knox. In FY04, design and develop a new Field-of-View (FOV) search model for integration into the Combined Arms and Support Task Force Evaluation Model. In FY05, will evaluate the new FOV search model, improve multispectral modeling, and deliver one sensor Semi-Automated Forces (SAF) Test-bed to Fort Knox.		4060	4160	4670
Lightweight Laser Designators. In FY04, verify critical designator system specifications with users. Carry out technology tradeoffs and initiate solid-state laser design. In FY05, selected basic solid-state laser design will be built and tested in the laboratory to verify energy output, beam quality and operation over temperature.		0	2050	2650
Low Cost High Resolution Focal Plane Array. In FY04, research long wave FPA of Mercury-Cadmium Telluride (MCT) on Silicone and evaluate shutter time constant uncooled arrays. In FY05, will evaluate multi-band pixel interconnect approach, patterned thin-film filters on CdZnTe, and 1280x720 uncooled ROIC design and fabrication.		0	7390	7367
Small Business Innovative Research/Small Business Technology Transfer Programs		0	246	0

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**H95****Accomplishments/Planned Program B(continued)**

	FY 2003	FY 2004	FY 2005
Totals	18707	21506	22617

**B. Program Change Summary**

	FY 2003	FY 2004	FY 2005
Previous President's Budget (FY 2004)	19696	22233	22420
Current Budget (FY 2005 PB)	18707	21506	22617
Total Adjustments	-989	-727	197
Congressional program reductions		-209	
Congressional rescissions			
Congressional increases			
Reprogrammings	-989	-518	
SBIR/STTR Transfer			
Adjustments to Budget Years			197