ARMY RDT&E BUDGET ITEM JUSTIFICATION (R2 Exhibit)

February 2004

BUDGET ACTIVITY
2 - Applied Research

PE NUMBER AND TITLE
0602120A - Sensors and Electronic Survivability

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		21700	25230	25629	31703	34843	35232	31255
140	HI-POWER MICROWAVE TEC	2718	2805	3009	3680	3745	3749	3816
H15	GROUND COMBAT ID TECH	3617	4678	4782	5829	5901	5972	7889
H16	S3I TECHNOLOGY	15365	14552	15083	18498	19644	20083	19550
SA1	SENSORS AND ELECTRONIC INITIATIVES (CA)	0	3195	0	0	0	0	0
SA2	BIOTECHNOLOGY APPLIED RESEARCH	0	0	2755	3696	5553	5428	0

A. Mission Description and Budget Item Justification: The objective of this program is to enhance the capabilities of the Future Combat Systems (FCS) and the Future Force and, where feasible, exploit opportunities to enhance Current Force capabilities by: providing sensor, signal, and information processing technology for advanced reconnaissance, surveillance, and target acquisition (RSTA), ground-to-ground and air-to-ground combat identification (ID), and fire control systems, as well as the fuzing and guidance-integrated fuzing functions in future munitions; and significantly improving the survivability, lethality, deployability, and sustainability of FCS by devising high-power electronic components and technologies for compact, light-weight power and energy storage, conversion and conditioning, and radio frequency (RF)-microwave directed energy (RF-DE) weapons. Critical technologies to be addressed to increase the combat effectiveness of tactical Army forces include: high power, solid-state/vacuum, power/RF component technology; combat identification technology; and sensors, signatures, signal and information processing (S3I) technology. Work in this PE is related to and fully coordinated with efforts in PE 0602307 (Advanced Weapons Technology), PE 0602705 (Electronics and Electronic Devices), PE 0602709 (Night Vision Technology), PE 0602782 (Command, Control, Communications Technology), PE 0603772 (Advanced Tactical Computer Science and Sensor Technology), and PE 0603008 (Command, Control, Communications Advanced Technology). The program element contains no duplication with any effort within the Military Departments. 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 performed by the Army Research Laboratory (ARL) and the Communications-Electronics Research, Development, and Engineering Center, Ft. Monmouth, NJ.

B. Program Change Summary	FY 2003	FY 2004	FY 2005
Previous President's Budget (FY 2004)	21820	22765	25510
Current Budget (FY 2005 PB)	21700	25230	25629
Total Adjustments	-120	2465	119
Congressional program reductions		-226	
Congressional rescissions			
Congressional increases		3300	
Reprogrammings	-120	-609	
SBIR/STTR Transfer			
Adjustments to Budget Years			119

Significant Change Explanation:
FY04 - Two FY04 Congressional Adds totaling $3300 were added to this PE.

FY04 Congressional Adds with no R-2A:
($1127) Disposable Sensors for Battlefield and Urban Warfare, Project SA1: The purpose of this one year Congressional add is to fund research on disposable sensors for use on the battlefield and in urban warfare. No additional funding is required to complete this project.

($1973) Portable Chemical-Biological Agent Detection System, Project SA1: The purpose of this one year Congressional add is to fund research on technologies to develop a portable chemical-biological agent detection system. No additional funding is required to complete this project.

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BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602120A - Sensors and Electronic Survivability**	**140**

COST (In Thousands)	FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
140 HI-POWER MICROWAVE TEC	2718	2805	3009	3680	3745	3749	3816

A. Mission Description and Budget Item Justification: This project has a dual focus: researching, developing and evaluating Directed Energy Weapon (DEW) technology as well as high power components that will significantly enhance the survivability and lethality of Army Future Combat Systems (FCS) platforms and related systems. The DEW effort includes studying both radio frequency microwave and laser system capabilities and effects against various threats, including improvised devices, electronically guided and fuzed missiles/munitions and electronic off and on route mines. Realizing DEW capabilities for diverse targets at a variety of lethality levels and operational ranges on FCS requires both optimizing the DEW system as well as developing compact, high density power systems meeting stringent FCS weight and volume restrictions. System optimization relies on determining the most effective Directed Energy (DE) parameters and system components needed to defeat classes of selected targets; i.e., studying the desired DE effects drives the DEW component and system design, including power. Required power system components include power generation and storage, high temperature/ high power devices, power converters, and power conditioning. The ongoing DE effects and power components work is coordinated with and, as appropriate, leveraged by DEW and power/energy programs in the Air Force, Navy, Defense Threat Reduction Agency, National Labs, university consortia and relevant industry and foreign partners. This work is also done in coordination with the US Army Research, Development and Engineering Command's Tank and Automotive Research, Development and Engineering Center (TARDEC), the Armaments Research, Development and Engineering Center (ARDEC), and the Communications and Electronics Research, Development and Engineering Center (CERDEC). The program element contains no duplication with any effort within the Military Departments. 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 on this project is performed by the Army Research Laboratory (ARL).

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
- Research and develop high power converters and enabling technology, such as high-temperature devices to achieve high-power and temperature operation for high power demand capabilities, including Directed Energy Weapons, while meeting the stringent weight/volume requirements for Future Combat System and related platforms for the Future Force. In FY03, lab demonstrated the world's first 100 kilowatt (kW) silicon (Si) based matrix converter at 130% of full power for alternating current (AC) motor control; designed and fabricated a compact 10 kW Si modified matrix converter (MMC) for mobile electric power; investigated/identified pulse charger design to support distributed electromagnetic armor survivability systems. In FY04, show 10 kW Si MMC (400 Hz input frequency) in a generator-set with variable motor control that is fault-tolerant to unbalanced loads; scale MMC power modules to FCS power levels for direct current – alternating current (DC-AC) conversion for motor control; show next-generation digital signal processor and control software for MMC power modules for high-efficiency low – interference power converters. In FY05, investigate and mature high-temperature silicon carbide (SiC) power modules for >100 kW-level power conversion at 150 Celsius (C) for motor control, for vehicle power bus and for vehicle survivability and lethality systems. This is in support of TARDEC work on power generation, conditioning and control for hybrid electric vehicle and pulse power for Future Combat Systems.	1290	1380	1083

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
- Investigate the feasibility and effectiveness of radio frequency (RF) DEW concepts by determining the power/energy requirements to defeat threats, such as electronically guided and/or fuzed munitions and mines. Analytically and experimentally determine the RF field strength/power density required on the targets to produce functional kill. Determine the most effective DE frequencies/wavelengths and modulations (duty cycles/pulse widths/repetition rates) to defeat the target's performance. Use the measured effect levels to develop power and system requirements for the concepts. Support Research Development and Engineering Centers (RDECs) in development of breadboard/brassboards to show proof of principal. In FY03, investigated the effects of RF and Laser DE sources on four threat electro-optic/infrared (EO/IR) sensors in support of ARDEC's Agile Target Effects Systems (ATES) Science and Technology Objective (STO) synergistic effects. Used the data to refine power/energy requirements for RF ATES. Also developed probability of failure estimates for air delivered RF warhead concept. (Off Board RF ATES). For CERDEC, investigated the effects on RF DE on off route mines/booby traps to investigate feasibility of a counter booby trap system. Conducted experiments on commercial receivers as surrogate trigger devices. In FY04, plan to continue investigating the effects of RF energy on threat anti-tank guided missiles (ATGMs) and representative booby traps to measure their effect levels. Also conduct lab/field experiments to demonstrate ATES concept and transition requirements to ARDEC. In FY05, use DE effects data to develop power/energy and system requirements for a counter booby trap and/or countermine and related devices and transition to CERDEC/ARDEC.	1036	1034	1083
- Investigate electronic warfare (EW) survivability, lethality, EW tools technology, and methodology research. In FY03 completed theoretical design analysis of a narrow band filter (Faraday Anomalous Dispersion Optical Filter (FADOF)) that provides a multi-spectral approach in identification of extremely low signature missile propellants. Conducted theoretical studies and devised algorithms for atmospheric propagation of this phenomenology. These technology efforts support the Full Spectrum Active Protection (FSAP) effort for TARDEC in support of the Future Combat Systems (FCS). In FY04, investigate integration of the FADOF onto FCS platforms, and devise Electronic Warfare (EW) methods and technologies for countering/defeating improvised explosive devices (IEDs). In FY05, investigate a methodology, tool set, and EW models for EW survivability analysis of military vehicles confronted with IEDs.	392	371	843
Small Business Innovative Research/Small Business Technology Transfer Programs	0	20	0
Totals	2718	2805	3009

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

February 2004

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602120A - Sensors and Electronic Survivability**	**H15**

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
H15	GROUND COMBAT ID TECH	3617	4678	4782	5829	5901	5972	7889

A. Mission Description and Budget Item Justification: Joint fires provide the ability for joint forces to locate, identify, track, and engage targets as necessary. As stated in the Joint Transformation Roadmap, this capability is to be available throughout the full range of military operations. In order to enable a joint fires capability, positive identification of the target as non-friendly by or for the shooter is critical, prior to engagement. At this time, US and Allied Forces lack a comprehensive combat identification (CID) system to prevent fratricide and enable a joint fires capability. The objective of this project is to mature and demonstrate emergent CID systems for joint, allied and coalition air-to-ground and ground-to-ground mounted, dismounted, forward observer and forward air controller mission for the Future Force and, where feasible, exploits opportunities to enhance Current Force capabilities. This program provides the technologies for the Coalition Combat Identification Advanced Concept Technology Demonstrations (ACTD) that is exploring and demonstrating CID with the UK, France, Germany, Canada, and Australia. The program provides maturation of the enabling technologies to demonstrate common identification (ID) standard agreements (STANAGs), reduce weight and cost, and evaluate radio frequency (RF) tags as a CID enabler. This program will set the baseline for the Future Force to enable fratricide reductions through CID concepts to include blue force tracking via RF Tags scanned by synthetic aperture radar/moving target indicator (SAR/MTI) radar. This program increases the survivability and lethality of Coalition Forces by providing a matured capability to identify friend from foe, thereby, reducing fratricide incidents across the battlefield. CID must be software functional, portable across a family of platforms, tied to the future tactical internet, over-the-horizon capable and highly resistant to countermeasures. The system must operate successfully in all weather environments and must not be impacted by smoke, fog, dirt and other obscurants. The Future Force CID capability will fuse situational awareness (SA) and Point-of-Engagement Target Identification into a common "through sight" picture. The future CID architecture will necessitate the integration of a network composed of diverse reconnaissance, surveillance and target acquisition (RSTA) sensors that include non-cooperative capabilities in the sensor suites and a cooperative ID capability that will be realized as part of the future network centric, real-time, red and blue SA for both combat vehicles and unit of action/unit of employment (UA/UE) Commander. Coordination will be accomplished with other services, allies and coalition partners. MANPRINT will be addressed in all activities. Future CID will operate with the Objective Force Warrior System providing a seamless boundary with vehicle CID.

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

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
- Coalition Combat Identification ACTD: In FY03, coordinated allied participation in the Coalition Combat Identification ACTD (GE, UK, FR, CA, AUS). Shared technical approaches to mature hardware and implemented the Battlefield Target ID (BTID) and Dismounted Soldier CID (DSCID) STANAGs. Matured Radio Based Combat Identification (RBCID) using the ASIP SINCGARS. In FY04, mature a smaller, lighter, more efficient and less costly version of the Battlefield Combat Identification System Millimeter Wave system with a NATO STANAG approved waveform. Coordinate establishment of a NATO standard for DSCID for a US/NATO common system to increase protection to the dismounted soldier. Plan/conduct a CID Military Operation in an Urban Terrain exercise. In FY05, will mature modeling and simulation capability to conduct international virtual operational exercise to evaluate technologies and test or establish new tactics, techniques, and procedures. Will conduct technical, operational, and simulated test and evaluation.	3617	3878	4056
- Network Centric Combat Identification Technologies: In FY04, evaluate the use of Ku and X - Band Digital Radio Frequency (RF) Tags for Blue Force Tracking and air-to-ground Combat Identification (CID). In FY05, will conduct operational testing and assess military utility of RF Tags in conjunction with a Synthetic Aperture Radar/Moving Target Indicator radar to provide passive CID. Will mature ground integrated target identification system for ground-to-ground CID for the Future Force. This will integrate CID data from cooperative and non-cooperative target identifiers (FLIR, EPLRS, RF Tags, Radar, tactical internet, etc.) and situational awareness sensors to display CID results through the sight. This will mitigate engagement latency and provides beyond line-of-sight capability.	0	684	726
Small Business Innovative Research/Small Business Technology Transfer Programs	0	116	0
Totals	3617	4678	4782

ARMY RDT&E BUDGET ITEM JUSTIFICATION (R-2A Exhibit)

February 2004

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602120A - Sensors and Electronic Survivability**	**H16**

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
H16	S3I TECHNOLOGY	15365	14552	15083	18498	19644	20083	19550

A. Mission Description and Budget Item Justification: This project is focused on advanced sensor, signal processing and information technologies to provide the Future Combat Systems (FCS), technologies for the future Soldier and other emerging thrusts with decisive new capabilities to locate, identify, and engage battlefield targets. The ultimate utility of this work will be to protect our Soldiers and to greatly increase their lethality and range and speed of engagement. Emphasis is on solving critical Army-specific battlefield sensing and information management problems such as dealing with false targets, complex terrain, movement of sensors on military vehicles, etc. Cost reduction is a key focus. Significant areas of research include: 1) Low cost sensors designed to be employed in large numbers as unattended ground sensors (UGS) for force protection, homeland defense, minefield replacements, counter terrorism operations, and munitions. Research is conducted in fusion of diverse sensors such as acoustic, seismic, magnetic, radar, infrared (IR), visible imagers, etc. Technical barriers are: diverse, low-power sensors, autonomous networks, and sensor fusion. Applicable Algorithms and concepts are transitioned to Communications-Electronics Research, Development and Engineering Center (CERDEC) Disposable Sensors Program. 2) Low cost acoustic, seismic and magnetic sensors that can passively detect and track battlefield targets such as tanks, helicopters, etc. and locate gun fire. 3) Sensor technologies for the detection and tracking of humans, especially in urban terrain. Technical barriers: effective fusion of many diverse sensor types and innovation of high reliability, low cost approaches. 4) High performance multi-function radio frequency (RF) systems which allow target acquisition, combat identification (ID), active protection, surveillance, and communications systems consolidated into a single system, reducing system cost and size. Technical barrier: maintaining performance of each function in the combined system. 5) Passive and active RF sensors capable of high-resolution imaging to detect targets hidden in foliage, smoke and fog. Ultra wideband radar work will enable buried mine detection and target imaging through dense foliage and will greatly enhance robotic mobility. Technical barriers include real-time signal processing and false alarm rate. 6) Aided/automatic target recognition (ATR) to allow sensors to autonomously locate and identify targets. Algorithms will minimize the workload on the soldier in combat to find and identify targets using laser radar (LADAR), multi-band infrared cameras, and hyperspectral imagers. 7) Opto-Electronic (OE) interconnects and processors are being built to greatly speed the movement of information within and between electronic digital processing units to facilitate smart sensors, adaptive sensors, and sensor fusion. Sensor processing, analysis, and displays will provide soldiers with clearer, higher resolution images from their targeting systems. 8) Advanced battlefield sensor and information processing to conduct a dynamic and real time situation assessment to present a common picture of the battlespace. Technical barriers: fusion of data from dissimilar sensors, coherent display of complex information, and human factors. 9) Advanced information processing methods to provide automatic information technologies which utilize widely dispersed sensor and legacy information sources. Technical barrier: development of autonomous networks. 10) Sensor and eye protection against laser threats. Technical barrier: optical designs and materials that can respond fast enough and large enough over the bandwidth of the detector. . Work is coordinated with outside organizations, particularly the Night Vision Electronic Sensors Directorate, other Research and Development Engineering Centers (RDECs) and the Defense Advanced Research Projects Agency (DARPA). This work supports the following Army Programs: FCS, OFW, Networked Sensors for the Objective Force (NSfOF) Advanced Technology Demonstration (ATD), Multi-Function Starting Sensors Suite (MFS3), Disposable Sensors, Cave and Urban Assault Advanced Concept Technology Demonstration (ACTD),

Warrior's Edge, command, control, communications and computers (C4) on the Move, Anti-Personnel Landmine Alternatives (APLA), 3rd Generation forward-looking infrared (FLIR), Full Spectrum Active Protection (FSAP), and Quicklook.

The program element contains no duplication with any effort within the Military Departments. 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 Laboratory (ARL).

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
- Mature underpinning technologies for low-cost unattended ground sensors (UGS) for homeland defense, counter-terrorism, FCS and the future soldier. Implement and mature advanced passive acoustic/seismic algorithms to detect, track and ID targets for UGS. In FY03, completed coding of the Army Acoustic Algorithms for multi-target vehicles recognition and localization; continued implementation of an acoustic / seismic database for ground vehicles and transient signatures and established new effort for a web application interface to ease accessibility; devised and evaluated transient algorithms for mortar detection; and conducted field exercises for experimentation, technology characterization, and capability determination. In FY04 implement acoustic / seismic sensor fusion algorithm for multi-target tracking and ID in support of Networked Sensors for the Objective Force ATD; and design low-cost magnetic sensor for the Cave and Urban Assault ACTD and the CERDEC Disposable Sensors Program. In FY05, provide mature sensor nodes and algorithms along with RF, magnetic, electric field, and acoustic technology required for providing baseline personnel detection capability to CERDEC for use in Networked Sensors for the Objective Force ATD and transition to CERDEC Disposable Sensors Program.	5042	4738	3986

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
- Implement new target recognition and image understanding techniques to detect and ID targets in clutter for implementation on manned and unmanned systems. Mature low cost LADAR and target recognition techniques for 3rd Generation FLIR in support of CERDEC program for FCS sensors. In FY03, FLIR moving target indicator (MTI) algorithms to detect moving targets were transitioned to CERDEC customers and multi/hyperspectral image processing algorithm for target recognition applications of mine detection and camouflaged target detection were shown; devised improvements in performance of dual color FLIR algorithm over single band FLIR algorithms that were shown in a series of field experiments; and conducted field experiments using line array LADAR. In FY04, expand moving target techniques to include sensor effects and multiple sensors. In FY05, implement new target recognition algorithms in multi-sensor experiments, mature eye-safe staring array LADAR and conduct extensive field experiments.	1851	2054	2012
- Using models and measurements, determine effectiveness of ultra wideband (UWB) radar for detecting complex obstacles for robotic perception. Assess and remediate image formation artifacts that may limit the potential of UWB Synthetic Aperture Radar (SAR) to detect buried mines. In FY03, used improved imaging techniques to generate SAR imagery on positive (wire fence, tree stumps, and concertina wire) and negative obstacles (ditches). In FY04 devise radar-imaging techniques to assess the value of three dimensional (3D) resolution for detecting negative obstacles. In FY05, devise and evaluate physics-based mine detection algorithm.	1219	836	1072
- Complete enhanced RF signature measurement and hybrid electromagnetic (EM) modeling capabilities to enable prediction of tactical vehicle signatures through millimeter wave (MMW) frequencies for integrated survivability. Building on results from other work units, use enhanced models and measurements on tactical vehicles and clutter to produce improved target detection, tracking and classification algorithms for FCS tactical radars. In FY03, used exact electromagnetic solvers to assess the signature prediction performance of x-patch modeling software; characterized issues such as the vehicle computer aided design (CAD) accuracy, geometry complexity and material composition. In FY04, using facet files generated from CAD, model an FCS-like vehicle at X-band and Ka-band and assess accuracy of prediction. In FY05, evaluate hybrid approaches to model complex targets. Compare hybrid approaches to x-patch.	849	1480	1153

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
- Multifunction RF and optical interconnects for use on small ground and air vehicles and future Soldier technologies. Mature understanding of phenomenology for an integrated RF sensor that performs radio, radar, and control functions to allow communications, combat-ID, target acquisition and track, active protection, and munition command guidance for use on small ground and air vehicles. Mature optical data links and optical data processing architectures to accept massive raw data streams from multiple FCS sensors and efficiently produce real-time battlespace information for commanders and the future Soldier. Mature models and evaluate networked sensor concepts in support of netted fires to allow dynamic updating of weapons in-flight. In FY03, characterized RF multi-function and communication waveforms in a testbed and generated location errors for various sensor types and mixes. Showed dense two dimensional (2D) arrays of flip-chip OE interconnects with increased bandwidth and identified specific Army platforms needing such high throughput OE networking capabilities. In FY04 devise refined multi-sensor tracking techniques, assess monopulse tracking errors of kinetic energy (KE) penetrators, and devise beam scheduling techniques and complementary detection algorithms for a multi-function tactical radar. Demonstrate integrated OE digital-halftone image compression. Work with RDECs and commercial off-the-shelf (COTS) vendors to insert OE interconnects and networking into Army missile, helicopter, and tank platforms. Devise deep-ultraviolet (UV) semiconductor emitter technology for bio-detection and non-line-of-sight ground sensor coms. In FY05, determine the utility of polarimetric MMW imaging for aircraft navigation, landing, and obstacle avoidance in limited visibility conditions. Establish improvement in munition lethality available through dynamic updating. Transition UV emitter technology into ARL ground sensor technology demonstrations.	3768	2488	2205
- Improve Commander's situational understanding in complex/urban terrain by maturing infrastructure and validating algorithms, filters and agent technologies to reduce cognitive load by fusing information. In FY03, provided agent architecture to enable information fusion from diverse databases. In FY04, devise analytical and computing techniques to present information to soldiers and commanders in an easily understood and perceived form. In FY05, transition Web enabled enhanced service-based tools with integrated organizational capability from autonomous asset management and tactical decision aids that reduce both cognitive load and uncertainty to CERDEC Network Centric Warfare C2 Program (follow on to CERDEC Agile Commander Advanced Technology Demonstration).	2281	2270	2625

Accomplishments/Planned Program (continued)	FY 2003	FY 2004	FY 2005
Research, develop and demonstrate optical limiting to protect sensors and eyes from threat laser sources on the modern battlefield. Redesign of optical devices and exploration of new nonlinear optical materials. In FY03, designed and fabricated sacrificial novel mirrors. In FY04 characterize mercury mirrors. In FY05 design fast switches and nonlinear photonic band gap devices.	355	630	2030
Small Business Innovative Research/Small Business Technology Transfer Programs	0	56	0
Totals	15365	14552	15083

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February 2004

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - Applied Research	**0602120A - Sensors and Electronic Survivability**	**SA2**

COST (In Thousands)		FY 2003 Actual	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate
SA2	BIOTECHNOLOGY APPLIED RESEARCH	0	0	2755	3696	5553	5428	0

A. Mission Description and Budget Item Justification: This project supports maturing biotechnology, which is being conducted at the Army's Institute for Collaborative Biotechnology (ICB). The ICB is focused on advancing the survivability of both the soldier and weapons systems through fundamental breakthroughs in the area of biotechnology. This applied research effort will ensure that the basic science developed at the ICB is directed towards and transitioned to Army devices and systems. The effort will be conducted collaboratively by the Army Research Laboratory, the ICB and industry partners. The process of Transformation requires revolutionary advances in performance of Army weapons systems, including improvements in engineered systems impacting soldier survivability. The ICB will conduct unclassified basic scientific research in two areas of emphasis: (1) sensors, electronics and information processing and (2) technical fundamentals enabling development of advanced capabilities in these application areas. The Army seeks to provide the interdisciplinary fundamental knowledge and technical capabilities to manipulate biological systems and components, and to exploit biologically derived products and processes for both the soldier and engineered systems and platforms. This program element contains no duplication with any effort within the Military Departments. 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 Laboratory (ARL).

Accomplishments/Planned Program	FY 2003	FY 2004	FY 2005
Exploit breakthroughs in biotechnology basic research transitioning from the Institute for Collaborative Biotechnology (ICB), a University Affiliated Research Center, to enable revolutionary Future Force capabilities in sensors, electronics and photonics. Devise, fabricate, and show novel “sense and respond” systems based on biological and biologically-inspired materials, devise novel biologically-inspired routes to fabricate electronic, optical, and magnetic materials, devise the tools to examine these materials, and design and perform the multi-scale dynamic and predictive modeling to understand the biologically-inspired “sense and respond” systems and their components. In FY05 mature emerging opportunities in areas such as biomolecular based detector arrays for new sensors, biological photovoltaic power sources for reduced logistics demand, and biomimetics and biomimetics processing leading to new electro-optic materials, chemical detectors and structural multifunctional smart materials. Applied research will be conducted by ARL in collaboration with ICB industry partners.	0	0	2755
Totals	0	0	2755