

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

June 2001

BUDGET ACTIVITY

3 - ADV TECHNOLOGY DEV

PE NUMBER AND TITLE

0603606A - Landmine Warfare and Barrier Advanced Technology

COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	45918	20702	23062	0	0	0	0	0	0	0
608 COUNTERMINE & BAR DEV	26864	18083	20114	0	0	0	0	0	0	0
683 ANTI-PERSONNEL LANDMINE (APL) ALTERNATIVES	19054	2619	2948	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification:

PLEASE NOTE: This administration has not addressed FY2003-2007 requirements. All FY 2003-2007 budget estimates included in this book are notional only and subject to change.

This Program Element (PE) matures and demonstrates robust countermines technologies for the Army's Transformation to the Objective Force. Operations in Bosnia and Kosovo have shown the need for better ways to detect and neutralize land mines. High priority countermines requirements include in-stride detection and breaching, close-in detection, area clearance and neutralization of landmines. This PE funds remote detection of minefields, and individual mine detection from handheld, ground and aerial sensor systems. Envisioned mines include both metallic and low/non-metallic construction. The use of wide-area multi-sensor fusion detection systems, coupled with small-area confirmation sensors, will be emphasized to increase Operational Tempo (OPTEMPO) of the Objective Force. This multi-sensor approach has the potential to yield high probability of mine detection at very low false alarm rates. Airborne multispectral/hyperspectral mine detectors will be assessed for contingency applications and matured for lightweight plug-and-play use in mission specific applications. The expectation is robust approaches to finding surface-laid and buried mines in varying vegetation, soil and diurnal conditions. Alternative systems for anti-personnel (AP) landmines and innovative concepts for minefield clearance also will be explored. Advanced Technology Demonstration (ATD), Advanced Warfighting Experiments (AWE), and modeling and simulation activities will be performed to assess effectiveness of technical and system concepts. Efforts within this PE are closely coordinated with the Marine Corps. The work in this program follows the Army Science and Technology Master Plan (ASTMP), the Army Modernization Plan and Project Reliance. It also adheres to Tri-Service/Project Reliance Agreements on conventional air/surface weapons and ground vehicles. This PE contains no duplication with any other effort with the Army, or DoD. It also is fully coordinated with PE 0603619A (Landmine Warfare and Barrier Advanced Development), PE 0602712A (Countermines Systems) and PE 0602709A (Night Vision Technology). This PE is managed by the Night Vision Electronic Sensors Directorate (NVESD), Communications-Electronics Research, Development and Engineering Center (CERDEC).

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<u>B. Program Change Summary</u>	FY 2000	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2001 PB)	47117	20894	22976	0
Appropriated Value	47456	20894	0	
Adjustments to Appropriated Value	0	0	0	
a. Congressional General Reductions	0	0	0	
b. SBIR / STTR	-1199	0	0	
c. Omnibus or Other Above Threshold Reductions	-184	0	0	
d. Below Threshold Reprogramming	0	0	0	
e. Rescissions	-155	-192	0	
Adjustments to Budget Years Since FY2001 PB	0	0	86	
Current Budget Submit (FY 2002/2003 PB)	45918	20702	23062	0

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BUDGET ACTIVITY 3 - ADV TECHNOLOGY DEV				PE NUMBER AND TITLE 0603606A - Landmine Warfare and Barrier Advanced Technology					PROJECT 608	
COST (In Thousands)	FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
608 COUNTERMINE & BAR DEV	26864	18083	20114	0	0	0	0	0	0	0
A. Mission Description and Budget Item Justification: This project matures countermine technologies for integration into the Future Combat Systems (FCS) and other uses in the Objective Force. Specific activities include remote detection of minefields, and individual mine detection from handheld, ground and aerial sensor systems. Envisioned mines include both metallic and low/non-metallic construction. Wide-area multi-sensor fusion detection systems, coupled with small-area confirmation sensors, will be evaluated in their potential to yield high probability of mine detection at very low false alarm rates. The intent is to increase the OPTEMPO of the Objective Force. Airborne multispectral/hyperspectral mine detectors will be assessed for contingency applications and matured for lightweight plug-and-play use in mission specific applications. The expectation is robust approaches to finding surface-laid and buried mines in varying vegetation, soil and diurnal conditions. The project will provide soldier-portable, countermine capabilities to the dismounted combat engineer by adapting commercial, or emerging Defense Advanced Research Projects Agency (DARPA) technologies. Envisioned technology areas include robotics, infrared and visual imagery, acoustics, signal processing, electronic and physical mine marking, and telemetry. The intent is to provide enhanced Situational Awareness (SA) to infantry and other dismounted forces prior to their entry into the enemy/obstacle range of engagement. These efforts support ATDs, AWE, and modeling and simulation assessments, defining potential system effectiveness the Objective Force. This program supports the Objective Force transition path of the Transformation Campaign Plan (TCP). <u>FY 2000 Accomplishments</u> 9262 - Evaluated Mine Hunter/Killer integration of close-in mine detection and neutralization capabilities which dramatically improve the rate at which maneuver/transport lanes are cleared through mine fields. - Evaluated teleoperation capability of Mine Hunter/Killer for on-route missions. - Evaluated downselected precision neutralization technology against surface and buried anti-tank (AT) mines in various soils, overburden and environmental conditions and demonstrated greater than a 90% probability of kill for neutralization. - Completed Mine Hunter/Killer demonstration and transitioned mine neutralization technology and neutralization placement techniques to the Ground Standoff Mine Detection System (GSTAMIDS) acquisition program. 14153 - Completed design trade studies and initiated detailed design of a filter wheel modification for the advanced Tactical Unmanned Aerial Vehicle (TUAV) electro-optic/infrared (EO/IR) sensor. - Applied and matured minefield detection Aided Target Recognition (ATR) algorithms for multispectral sensors.										

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Advanced Technology**

PROJECT

608

FY 2000 Accomplishments (Continued)

- Performed ground and airborne data collections against buried and surface emplaced mines using multiple sensors that provided data to support phenomenology investigations and multispectral ATR algorithm selection and development.
- Matured system and component requirements/specifications and conducted an evaluation of a lightweight multispectral (laser polarization and long wave infrared) detection sensor optimized for surface minefield detection. Sensor weight will be compatible with future tactical/short range UAVs and capable of performing in a broad range of environments.
- 882 - Analyzed data from Joint Countermine (JCM) Advanced Concept Technology Demonstration (ACTD) demo II and applied lessons learned to detection and area clearance technology programs.
- Provided support for JCM command, control, communications, computers and intelligence (C4I) transition efforts.
- 2567 - Planned a Joint Area Clearance (JAC) effort to evaluate mine clearance techniques and prototypes for tactical use and proposed effort as an ACTD.
- Matured mission scenarios for Warfighter Exercises where various mine clearance prototypes will be evaluated for effectiveness.
- Identified mine clearance components and developed assessment strategies.

Total 26864

FY 2001 Planned Program

- 3451 - Evaluate scanning quadrupole resonance (QR) and advanced mine detection sensors (AMDS) technologies to assess performance for vehicle mounted mine detection applications in the Objective Force.
- Establish initial confirmation sensor technical benchmark.
- 13916 - Complete detailed design of filter wheel modification, fabricate modified sensor and perform initial airborne tests of the modified advanced TUAV EO/IR sensor against surrogate minefields.
- Complete detailed design and initiate fabrication of a prototype lightweight multispectral (laser polarization and long wavelength infrared) detection sensor.
- Complete maturation and evaluation of advanced minefield detection algorithms and enhance methods of airborne detection of buried and surface emplaced mines (increase probabilities of detection and reduce false detection rates).
- Evolve and design a test and evaluation strategy that will fully measure the ability of lightweight multi/hyperspectral technology to achieve the Army's airborne minefield detection requirements.

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Advanced Technology****PROJECT****608****FY 2001 Planned Program (Continued)**

- 264 - Finalize JAC ACTD planning.
- Establish user operational concept and perform component evaluation.
- Conduct initial Warfighter Exercises to evaluate mine clearance prototypes.
- 452 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 18083

FY 2002 Planned Program

- 6245 - Investigate integration of scanning quadrupole resonance mine detection technology onto a vehicle platform.
- Evaluate QR prototype and mature advanced electromagnetic technologies for mine target detection.
- 3046 - Evaluate mine clearance prototypes in focused JAC exercises with Marine Corps and Army user representatives and prepare interim military assessment of JAC capabilities.
- 1859 - Assess explosive detection chemical sensors, advanced electromagnetic techniques, and novel ground penetrating radars for use on small mobile robots for dismounted mine detection operations.
- 8964 - Complete field performance evaluation of the modified advanced TUAV EO/IR minefield detection sensor and aided target detection software suite.

- Assemble and integrate prototype lightweight multispectral (laser polarization and long wavelength infrared (LWIR)) minefield detection sensor and initiate system testing.

Total 20114

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BUDGET ACTIVITY 3 - ADV TECHNOLOGY DEV				PE NUMBER AND TITLE 0603606A - Landmine Warfare and Barrier Advanced Technology				PROJECT 683			
COST (In Thousands)		FY 2000 Actual	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate	Cost to Complete	Total Cost
683	ANTI-PERSONNEL LANDMINE (APL) ALTERNATIVES	19054	2619	2948	0	0	0	0	0	0	0
A. Mission Description and Budget Item Justification: This project provides Advanced Technology Demonstrations (ATDs) supporting an Objective Force capability for alternative systems for anti-personnel landmines (APLs) that minimize the risks to non-combatants. This includes alternatives to anti-personnel submunitions used in mixed anti-tank (AT) landmine systems and possibly to the entire mixed landmine systems themselves. The alternative systems will include surveillance systems, command and control systems, and overwatch fires which will be evaluated and matured in parallel to provide similar capabilities that are now provided by APLs and APL submunitions in mixed AT systems. Distributed simulation will be used to evaluate new concepts and modify tactics and procedures. Prototype components and system architectures will be constructed and evaluated in system field tests. This program supports the Objective Force transition path of the Transformation Campaign Plan (TCP). FY 2000 Accomplishments 8530 - Developed and evaluated alternative concepts through exploration studies. - Established independent study groups from National Academy of Science and Department of Defense National Laboratories. 8524 - Developed components and prototypes to support alternative studies. 2000 - Investigated the utility of a new generation of micro-sensors, communications and non-lethal munitions components and subsystems for mid-term mixed landmine alternatives. Total 19054											

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<u>FY 2001 Planned Program</u> • 2542 - Modify new generation of expendable day/night imaging sensors, communications devices, low cost point detectors and deterrent devices (lethal and non-lethal munitions) for force protection and landmine alternative roles. - Test and evaluate advanced technology brassboards for landmine alternatives concept development. • 77 - Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs. Total 2619 <u>FY 2002 Planned Program</u> • 2948 - Investigate mobility of an adaptable network of expendable sensors and new deterrent devices to meet landmine alternatives requirements and Future Combat Systems (FCS) protection roles. - Test mobility concepts of adaptable network sensors and deterrent devices for landmine alternative missions. Total 2948		