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

February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE
3 - Advanced technology development	**0603606A - Landmine Warfare and Barrier Advanced Technology**

	COST (In Thousands)	FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate
	Total Program Element (PE) Cost	19922	25640	24104	27296	31221	32267	32880
608	COUNTERMINE & BAR DEV	17630	22718	21170	22429	23468	24318	24818
683	ANTI-PERSONNEL LANDMINE (APL) ALTERNATIVES	2292	2922	2934	4867	7753	7949	8062

A. Mission Description and Budget Item Justification: This Program Element (PE) matures and demonstrates robust countermine technologies for the U. S. Army. Countermine requirements to include in-stride detection and breaching, close-in detection, area clearance, and neutralization of landmines. This PE demonstrates the remote detection of minefields as well as individual landmine detection from handheld, ground, and aerial sensor systems. The landmines being studied include both metallic and low/non-metallic landmines. The use of wide-area multi-sensor fusion detection systems, coupled with small-area confirmation sensors, also will be emphasized. This multi-sensor approach has the potential to yield a high probability of landmine detection at very low false alarm rates. In addition, airborne mine detectors will also be assessed for contingency applications and matured for lightweight plug-and-play use in mission specific applications. Alternative systems for anti-personnel landmines and innovative concepts for minefield clearance will be explored. Advanced Concept Technology Demonstrations, Advanced Warfighting Experiments, and modeling and simulation activities will be conducted to assess the effectiveness of system concepts. Efforts within this PE are closely coordinated with the U.S. Marine Corps. The work in this program follows the Army Science and Technology Master Plan, the Army Modernization Plan and Project Reliance. The program 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 within the Army or the Department of Defense. It also is fully coordinated with PE 0603619A (Landmine Warfare and Barrier Advanced Development), PE 0602712A (Countermine Systems) and PE 0602709A (Night Vision Technology). This PE is managed by the Night Vision Electronic Sensors Directorate, Communications-Electronics Research Development and Engineering Center. This program supports the Objective Force transition path of the TCP.

B. Program Change Summary	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2002 PB)	20702	23062	23614
Appropriated Value	20894	25862	0
Adjustments to Appropriated Value	0	0	0
a. Congressional General Reductions	0	-222	0
b. SBIR / STTR	-529	0	0
c. Omnibus or Other Above Threshold Reductions	0	0	0
d. Below Threshold Reprogramming	-250	0	0
e. Rescissions	-193	0	0
Adjustments to Budget Years Since FY2002 PB	0	0	490
Current Budget Submit (FY 2003 PB)	19922	25640	24104

Change Summary Explanation: Funding: FY 2002 - A Congressional add was made for Advanced Demining Technology, Project 608 ($2800)

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February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603606A - Landmine Warfare and Barrier Advanced Technology**	**608**

COST (In Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate
608	COUNTERMINE & BAR DEV	17630	22718	21170	22429	23468	24318	24818

A. Mission Description and Budget Item Justification: This project matures countermine technologies for integration into future combat systems. Specific activities include remote detection of minefields and individual landmine detection from handheld, ground and aerial sensor systems. The landmines being studied 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 a 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. This project has the potential to provide advanced countermine capabilities to the dismounted soldier by adapting commercial or emerging Defense Advanced Research Projects Agency technologies for standoff mine detection. These technology areas include robotics, infrared and visual imagery, radio frequency, signal processing, electronic and physical mine marking and telemetry. The intent is to provide enhanced situational awareness to infantry and other dismounted forces prior to their entry into harms way. This project also evaluates area clearance systems under the Joint Area Clearance (JAC) advanced concept technology demonstration (ACTD) as a means to determine the best system to procure for rear area and supply route clearance operations. These efforts support ACTDs, Army Warfighting Experiment, modeling and simulation assessments and defines potential system effectiveness. This project supports the Objective Force transition path of the TCP.

FY 2001 Accomplishments:

- 3450
  - Evaluated scanning quadruple resonance (QR) and advanced mine detection sensors technologies to assess performance for vehicle mounted mine detection applications in the Objective Force.
  - Established initial confirmation sensor technical benchmark.
- 13916
  - Completed detailed design of filter wheel modification and fabricated a minefield-specific prototype of the modified advanced tactical unmanned aerial vehicle (TUAV) electro-optic(al) (EO/IR) sensor against surrogate minefields.
  - Completed detailed design and initiated fabrication of a model lightweight multispectral (laser polarization and long wavelength infrared) detection sensor.
  - Completed maturation and evaluation of advanced minefield detection algorithms and enhanced methods of airborne detection of buried and surface emplaced mines (increased probabilities of detection and reduced false detection rates).

FY 2001 Accomplishments: (Continued)

- Evolved and designed a test and evaluation strategy that fully measures the ability of lightweight multi/hyperspectral technology to achieve the Army's airborne minefield detection requirements.

• 264 - Finalized JAC ACTD planning.

- Established user operational concept and performed component evaluation.

- Conducted initial Warfighter Exercises to evaluate mine clearance models.

Total 17630

FY 2002 Planned Program

• 6206 - Demonstrate integration of scanning quadruple resonance (QR) mine detection technology onto a vehicle platform.

- Evaluate QR system and mature advanced electromagnetic technologies for mine target detection.

• 3006 - Evaluate mine clearance models in focused JAC exercises with Army and U.S. Marine Corps user representatives and prepare interim military assessment of JAC capabilities.

• 1801 - Assess explosive detection chemical sensors, advanced electromagnetic techniques, and novel ground penetrating radars for use on small mobile robots for dismounted mine detection operations.

• 8905 - Complete field performance evaluation of the modified advanced TUAV EO/IR minefield detection sensor and aided target detection software suite.

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

• 2800 - This one year Congressional add demonstrates a remotely operated, mine detection and mine clearing system. No additional funding is required to complete this project.

Total 22718

FY 2003 Planned Program

- 8507 - Complete trade studies for development of power, weight, and operational specifications of handheld, ground and aerial sensor systems.

  - Complete evaluation of handheld, ground and aerial sensor candidates.

  - Complete integration of prototype scanning quadruple resonance, advanced electromagnetic mine detection, or other sensor technologies on a vehicle platform and perform performance evaluation (probability of detection, false-alarm rate, position accuracy, and rate of advance).
- 2597 - Conduct military assessment of JAC capabilities and transition residual hardware to users.
- 3247 - Fabricate and test sensor component technologies for the robotic mine detection system. Identify appropriate robotic platform and begin sensor integration.
- 3663 - Complete field performance evaluation of the prototype lightweight multispectral (laser polarization and LWIR) minefield detection sensor and aided target detection system and transition technologies to an Army acquisition program.
- 3156 - Specify hardware configuration and software needs for a multisensor, forward looking mine detection model.

Total 21170

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February 2002

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
3 - Advanced technology development	**0603606A - Landmine Warfare and Barrier Advanced Technology**	**683**

COST (In Thousands)		FY 2001 Actual	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	FY 2006 Estimate	FY 2007 Estimate
683	ANTI-PERSONNEL LANDMINE (APL) ALTERNATIVES	2292	2922	2934	4867	7753	7949	8062

A. Mission Description and Budget Item Justification: This project provides technology demonstrations in support of alternative systems for anti-personnel landmines (APLs) that help minimize the risks to non-combatants. This includes alternatives to anti-personnel submunitions used in mixed anti-tank (AT) landmine systems. The alternatives will include surveillance systems, command and control systems, and overwatch fires. These will be evaluated and matured in parallel in order to provide similar capabilities which are currently provided by APLs and APL submunitions in mixed AT systems. Distributed simulation will be used to evaluate new concepts and modify doctrine. Modeling components and system architectures will be constructed and evaluated in system field tests. This project supports the Objective Force transition path of the TCP.

FY 2001 Accomplishments:

• 2292 - Modified and matured a new generation of expendable day/night imaging sensors, communication devices, low cost point detectors, and deterrent devices (lethal and non-lethal munitions) for force protection and landmine alternative roles.

- Tested and evaluated advanced technology brassboards for landmine alternatives concept demonstration.

- Matured generic technology simulations to support the concept demonstration phase of APL Track III program. Completed maturation of generic Track III munition control station simulator. Integrated communications model with generic control station to provide realistic communications link between the controller and remote munitions.

- Integrated Track III simulations into the Mounted Maneuver Battle Lab's FY 2001 Future Combat Command and Control Experiment to enable the operational evaluation of Track III concepts in the context of the Army Objective Force.

Total 2292

FY 2002 Planned Program

- 2922 - Demonstrate the mobility of an adaptable network of expendable sensors and new deterrent devices in order to meet landmine alternatives requirements and Future Combat Systems protection roles.
  - Test mobility concepts of adaptable network sensors and deterrent devices for landmine alternative missions.

Total 2922

FY 2003 Planned Program

- 2934 - Mature system concepts for landmine alternative mid-term solutions.
  - Mature product improvements and transition Defense Advanced Research Projects Agency Track II concepts to the Track III landmine alternative system.

Total 2934