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

June 2001

BUDGET ACTIVITY
2 - APPLIED RESEARCH

PE NUMBER AND TITLE
0602307A - Advanced Weapons 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		4000	6646	19043	0	0	0	0	0	0	0
042	HIGH ENERGY LASER TECHNOLOGY	4000	489	19043	0	0	0	0	0	0	0
04G	MINIATURE DETECTION DEVICES & ANALYSIS METHODS	0	2979	0	0	0	0	0	0	0	0
04H	ZEUS LASER ORDNANCE NEUTRALIZATION	0	3178	0	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.

Recent advances in solid state laser and other High Energy Laser (HEL) weapons technologies may set the stage for the development of Army tactical laser weapons capability for the Objective Force. Potential HEL mission areas include counterair munitions defense and airborne electro-optical sensor countermeasures. Technical issues such as lethality; laser fluence degradation due to atmospheric effects; precision optical pointing and tracking; and effectiveness against low-cost laser countermeasures, must be resolved before any weapon system development can commence. To support the resolution of these technical issues, this project will leverage existing laser weapon programs such as the US/Israeli Tactical High Energy Laser ACTD, the USAF Airborne Laser Program, and the Department of Energy National Ignition Facility. In addition, this project will develop preliminary system designs to highlight potential sub-system/component issues attributable to technology integration. Current funding will develop a diode-pumped 15kW solid state laser breadboard by FY04. The work in this program element is consistent with the Army Directed Energy Master Plan and the Army Modernization Plan. Work in this program element is related to and fully coordinated with efforts in PE 605605A (DOD High Energy Laser Systems Test Facility) and PE 0603308A (Army Missile Defense Systems Integration) in accordance with the ongoing Reliance joint planning process and contains no unwarranted duplication of effort among the Military Departments. Work is performed by the US Army Space and Missile Defense Command (SMDC), in Huntsville, AL.

B. Program Change Summary	FY 2000	FY 2001	FY 2002	FY 2003
Previous President's Budget (FY2001 PB)	0	993	993	0
Appropriated Value	0	6693	0	
Adjustments to Appropriated Value	0	0	0	
a. Congressional General Reductions	0	0	0	
b. SBIR / STTR	0	0	0	
c. Omnibus or Other Above Threshold Reductions	4000	0	0	
d. Below Threshold Reprogramming	0	0	0	
e. Rescissions	0	-61	0	
Adjustments to Budget Years Since FY2001 PB	0	0	18050	
Current Budget Submit (FY 2002/2003 PB)	4000	6632	19043	0

Change Summary Explanation: Funding - FY 2000: a Congressional add for ZEUS (4000) was reprogrammed from procurement to RDTE. Work was performed by SMDC, Huntsville, AL.

FY2001: Congressional adds were received for Project 04G, Miniature Detection Devices Sensors and Isotope Identification (+3000), and Project 04H, Zeus Laser Ordnance neutralization (+3200). 500K for Solid State Lasers was transferred to RDTE, Defense Wide.
- (+3200) Design, fabricate, test and evaluate full-scale, integrated Zeus laser ordnance neutralization system utilizing a 1kw laser for safe and effective destruction of unexploded ordnance and surface-laid

mines
- (+3000) Evaluate miniature detection devices and analysis methods for lightweight power sensors and isotope identification techniques.

In FY 2002/2003 funding was increased to meet the needs for increased lethality options for Future Combat Systems (FCS) and the Objective Force through enhanced efforts in Solid State High Energy Laser Technology and Chemical High Energy Laser Technology (FY 02 +18050 and FY 03 +10242).

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

June 2001

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
2 - APPLIED RESEARCH	**0602307A - Advanced Weapons Technology**	**042**

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
042 HIGH ENERGY LASER TECHNOLOGY	4000	489	19043	0	0	0	0	0	0	0

A. Mission Description and Budget Item Justification: Recent advances in solid state laser and other High Energy Laser (HEL) weapons technologies may set the stage for the development of Army tactical laser weapons capability for the Objective Force. Potential HEL mission areas include counterair munitions defense and airborne electro-optical sensor countermeasures. Technical issues such as lethality; laser fluence degradation due to atmospheric effects; precision optical pointing and tracking; and effectiveness against low-cost laser countermeasures, must be resolved before any weapon system development can commence. To support the resolution of these technical issues, this project will leverage existing laser weapon programs such as the US/Israeli Tactical High Energy Laser ACTD, the USAF Airborne Laser Program, and the Department of Energy National Ignition Facility. In addition, this project will develop preliminary system designs to highlight potential sub-system/component issues attributable to technology integration. Current funding will develop a diode-pumped 15kW solid-state laser breadboard by FY04. Successful progress in this 15kW effort would lead to the development of a 100kW demonstrator and this enhanced effort would be reinforced with additional resources. The work in this program element is consistent with the Army Directed Energy Master Plan and the Army Modernization Plan. Work in this program element is related to and fully coordinated with efforts in PE 605605A (DOD High Energy Laser Systems Test Facility) and PE 0603308A (Army Missile Defense Systems Integration) in accordance with the ongoing Reliance joint planning process and contains no unwarranted duplication of effort among the Military Departments. Work is performed by the US Army Space and Missile Defense Command (SMDC), in Huntsville, AL.

FY 2000 Accomplishments

- 4000 Design, fabricate, test and evaluate full-scale, integrated Zeus laser ordnance neutralization system utilizing a 1kW laser for safe and effective destruction of unexploded ordnance and surface-laid mines.

Total 4000

FY 2001 Planned Program

- 474 Identify and assess technical issues such as lethality, laser fluence degradation due to thermal blooming and atmospheric obscurants, precision optical pointing and tracking, and effectiveness against low-cost laser countermeasures.
- 15 Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) Programs.

Total 489

FY 2002 Planned Program

- 16043 Begin multi-year development of diode-pumped 15kW solid-state laser breadboard. This breadboard will represent the basic building block for higher power solid state lasers and demonstrate basic technology readiness. Major efforts will include:

  - Laser Diode Development: Produce diode/cooler packages to populate a full-size three-disk laser module using rack & stack technology. Reduce the production cost of laser diode/cooler integrated packages to $5/W. Demonstrate integration of prime power at the 1kW/kg level.

  - Thermal Management: Demonstrate ability to maintain disk temperature to a delta of < 1oC across a single subscale disk. Will also demonstrate (off-line) a 3-minute cooldown system with mist cooling and a 5W/kg cooling capability.

  - Beam Control: Develop a testbed to assess and define atmospheric compensation requirements with closed-loop feedback. Based on detailed wave optic codes, the beam diameter to coherence length ratio (D/ro) estimate for propagation is 5. Using this ratio as a basis, demonstrate tilt-only atmospheric correction improvement in the Strehl ratio from 0.18 (non-corrected) to 0.28 and a tilt and focus correction improvement of 0.32.

  - Design Analysis: Determine system parameters required for an effective tactically mobile HEL weapon. Assess atmospheric propagation, system lethality, size constraints and technology maturity for various HEL technology approaches.

  - Engineering Design: Perform first-order-detailed design of a tactically mobile HEL Air Defense Weapon System to include the engineering design and analysis complete with simulation-based feasibility assessments of systems performance as a function of threat. Assess atmospheric effects and compensation, where applicable; system lethality; size constraints; life cycle costs; total system cost-per-kill; logistical burden; and technology maturity. Identify barriers to building a tactically mobile HEL system for air to ground deployment.

- 3000 Begin the evolution of the Tactical High Energy Laser system into a weaponized, smaller and mobile system capable of destroying rockets, artillery, and mortar threats. Major examples will include:

  - Design Analysis: Examine system architecture and concepts; perform technical and engineering risk reduction.

  - Lethality Assessment: Expand lethality database, confirm and expand simulations and models, test against a threat set.

Total 19043