RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2002
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense Wide/BA 3	**R-1 ITEM NOMENCLATURE** High Energy Laser Advanced Development **PE 0603924D8Z**

COST *(In Millions)*	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007	Cost to Complete	Total Cost
Total Program Element (PE) Cost	0.000	15.842	13.567	11.133	8.723	6.331	3.950	Continuing	Continuing
High Energy Laser/P924	0.000	15.842	13.567	11.133	8.723	6.331	3.950	Continuing	Continuing

(U) A. Mission Description and Budget Item Justification

(U) BRIEF DESCRIPTION OF ELEMENT

U) This program element funds High Energy Laser (HEL) advanced technology development aimed at translating technology solutions for broadly defined military problems into demonstrated performance pay-offs, increased capabilities, increased supportability, or increased affordability. HEL weapons systems have many potential advantages, including speed-of-light time-to-target, high precision, nearly unlimited magazine depth, low cost per kill, and reduced logistics requirements because of no need for stocks of munitions or warheads. As a result, HELs have the potential to perform a wide variety of military missions, including some that are impossible, or nearly so, for conventional weapons. These include interception of ballistic missiles in boost phase, defeat of high-speed, maneuvering anti-ship and anti-aircraft missiles, and the ultra-precision negation of targets in urban environments with no collateral damage. Research conducted under this program element develops and demonstrates the technology necessary to enable these and other HEL missions.

(U) This program element is part of an overall DOD initiative in HEL science and technology being conducted by the HEL Joint Technology Office (JTO). The goals of this HEL JTO-funded research are to provide the technology to make HEL systems more effective and also to make them lighter, smaller, cheaper, and more easily supportable on the battlefield. In general, efforts funded under this program element are chosen for their potential to have major impact on multiple HEL systems and on multiple Service missions. As a result of this focus and of close coordination with the military departments and defense agencies, this program element complements other DOD HEL programs that are directed at more specific Service and agency needs.

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(U) A broad range of technologies are addressed in key areas such as chemical lasers, solid-state lasers, beam control, optics, propagation, and free-electron lasers. Under this program element these technologies are integrated and tested in sub-scale demonstration systems or sub-systems. Research is conducted by Government laboratories and industry, often teamed together. The program element funds integrated theoretical, computational, and experimental investigations. These integrated investigations are structured to convincingly demonstrate the piercing of technology barriers that currently prevent HELs from being fielded as viable weapon systems. In addition, they are structured to permit rapid technology transition. As results become available, DOD will transmit them to appropriate military-department, defense-agency, and industry programs for technology transition, where appropriate.

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(U) Project Number and Title: P924 High Energy Laser

(U) PROGRAM ACCOMPLISHMENTS AND PLANS

(U) FY 2001 Accomplishments:

(U) None, this initiative is new as of FY 2002.

(U) FY 2002 Plans:

(U) Pursuant to Congressional direction the DOD is developing a comprehensive, prioritized investment plan for HEL science and technology. This investment plan is being developed by the HEL JTO, in coordination with the military departments and the defense agencies. The plan, which will be completed by the end of FY01, will form the basis for the work to be conducted under this program element in FY02 and beyond, as well as the work to be conducted under companion basic-research and applied-research elements. Although the plan is not yet completed, the broad outlines of plan are becoming clear. Efforts to be included in the HEL advanced technology development funded by this program element will largely involve the extension or combination of particularly successful efforts funded under the HEL applied research program in FY01. It is anticipated that efforts under this program element will include one or more of the following:

- Solid-state-laser demonstration. Assemble successful pieces from individual applied-research projects (e.g., reliable pump diode lasers, diode-laser drivers, thin-disk amplifiers, phase-conjugate mirrors, mist cooling) into a demonstration sub-system scalable to weapons power levels.

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- Free-electron-laser (FEL) demonstration. Begin to develop a scalable FEL that can be operated on a military platform (e.g., a ship).
- Tactical beam-control demonstration. Using successful pieces from individual applied-research projects (e.g., deformable mirrors, wavefront sensors, advanced tracking and compensation algorithms) begin to develop a fieldable, sub-scale tactical beam-control system.

(U) FY 2003 Plans

(U) The program element will fund HEL advanced technology development as part of a comprehensive, prioritized investment plan for HEL science and technology. Efforts to be included in the HEL advanced technology development funded by this program element will largely involve the extension or combination of particularly successful efforts funded under the HEL applied research program in FY02. Particular attention will be given to efforts that are multi-service in nature and funds will be used to plan, prepare for, and run demonstrations that promise to greatly aid in the maturation of critical HEL technologies, especially if that maturation process requires integrated demonstrations. It is expected that the military departments and agencies will fund specific demonstrations of interest to them; this program element can be thought of in part as providing seed funding for such demonstrations. It is anticipated that efforts under this program element will include one or more of the following:

- Solid-state-laser demonstration. Assemble successful pieces from individual appalied-research projects (e.g., reliable pump diode lasers, diode-laser drivers, thin-disk amplifiers, phase-conjugate mirrors, mist cooling) into a demonstration sub-system scalable to weapons power levels.
- Free-electron-laser (FEL) demonstration. Begin designing and planning tests of a scalable FEL that can be operated on a military platform (e.g., a ship).
- Chemical laser demonstration. Begin development of integrated closed-cycle chemical-laser device of high power, to include realistic capability to regenerate spent laser fuels.
- Solid-state-laser demonstration. Assemble successful pieces from individual applied-research projects (e.g., reliable pump diode lasers, diode-laser drivers thin-disk amplifiers, phase-conjugate mirrors, mist cooling) into a demonstration sub-system scalable to weapons power levels.

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(U) B. Program Change Summary	FY 2001	FY 2002	FY 2003	Total Cost
Previous President's Budget Submission	0.000	0.000	1.006	Continuing
Delta	0.000	16.005	0.000	Continuing
FY 2002 Amended President's Budget Submission	0.000	16.005	1.006	Continuing
Appropriated Value	0.000	16.005	0.000	Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed Undistributed Reduction	0.000	-0.163	0.000	Continuing
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0.000	0.000	0.000	Continuing
c. Other	0.000	0.000	12.561	Continuing
Current FY 2003 Budget Submission	0.000	15.842	13.567	Continuing

Change Summary Explanation:

(U) **Funding**: The FY03 funding increases are the result of prorammatic and priority needs.

(U) **Schedule**:

(U) **Technical**: