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REPORT BY THE COMPTROLLER
GENERAL OF THE UNITED
STATES

THE DEPARTMENT OF
DEFENSE'S HIGH-ENERGY
LASER TECHNOLOGY PROGRAM--
DIRECTION AND FOCUS

D I G E S T

The United States has a technology development program which has the potential to revolutionize warfare, if critical scientific and technical questions can be favorably answered. This technology, referred to as directed energy, is composed of particle, laser, and microwave beams. These beams destroy targets through a narrow beam of electromagnetic radiation or atomic or sub-atomic particles, impacting the target--a revolutionary concept--and are expected to play an ever increasing role in the future. This report discusses one of these three directed energy technologies--the Department of Defense's (DOD's) High-Energy Laser Technology Program. GAO also reviewed the particle beam program and is reporting separately on it. (See p. 1.)

Since the late 1960s, DOD has been pursuing the technology to determine the feasibility of developing high-energy laser weapon systems. If proven to be useful weapons, high-energy lasers could deliver electromagnetic energy to destroy or incapacitate selected targets such as missiles, aircraft, infantry fighting vehicles, and space vehicles. According to DOD, such weapons could provide significant supplements to existing weaponry and fill voids in some mission applications in both the tactical and strategic arenas. In addition to the speed-of-light delivery of damaging energy, other expected advantages of high-energy laser weapons are to

--be less affected by the evasive maneuvering of targets,

--provide multiengagement and rapid retargeting capabilities, and

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--minimize collateral damage by delivering concentrated energy on specific targets. (See p. 2.)

WHAT IS BEING DONE?

The high-energy laser program is the largest single technology-base program DOD has underway. To date, DOD has spent about \$1.5 billion and plans an additional \$1 billion through fiscal year 1985. Decisions whether to prototype a high-energy laser weapon, once set as early as 1973, have been deferred to 1985 and possibly beyond.

DOD has accomplished several high-energy laser technology advances. However, many fundamental issues remain to be resolved before the overall feasibility of developing a laser weapon system can be determined. Each service has demonstrated, in controlled environments, that it could propagate a laser beam and point and track the beam. However, the technology necessary to reach decisions on weapon feasibility is not available. In some cases, performance improvement factors of 10 to 100 may be necessary before high-energy laser weapons will be viable. (See pp. 14, 15, and 17.)

The Directed Energy Programs Office was recently established by the Under Secretary of Defense for Research and Engineering to manage and direct the program. However, the Director has only one staff member to assist on the high-energy laser program and can do little more than attempt to prevent duplication among the independently managed programs. As a result, the services and the Defense Advanced Research Projects Agency continue in their independent attempts to develop technologies for various applications. (See pp. 16 and 17.)

CONCLUSIONS AND RECOMMENDATIONS

Prototype decision milestones have been deferred and DOD is at least 5 years and \$1 billion away from deciding whether to prototype the first high-energy laser weapon. Over the years, program direction has been determined by

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the individual services and the Defense Advanced Research Projects Agency, each pursuing mission applications of their own interest. This has resulted in a fragmented approach to solving a common problem--developing the technology necessary to determine whether to prototype a high-energy laser weapon. (See p. 23.)

The services, at various times, have assessed the technology needed to meet their specific missions. However, to date, there has been no assessment by DOD of how high-energy laser technology could best serve the national security needs. In view of the potential importance of a high-energy laser weapon(s), GAO recommends that the Secretary of Defense perform such an assessment considering

- the high-energy laser technology available now,
- the high-energy laser technology potentially available in the short and long term, and
- the military need(s) high-energy laser weapon(s) might best be able to satisfy. (See pp. 23, 24, and 25.)

Also, a recent Defense Science Board study recommended the high-energy laser program objective be redefined and its management be restructured to a centralized approach. DOD advised GAO that it would be unlikely that the management would be restructured in this manner. GAO believes that the Defense Science Board recommendations would be a first step toward providing more focus and direction to the high-energy laser program and should enable the Directed Energy Programs Office to accomplish the task for which it was chartered. GAO recommends that the Secretary of Defense reconsider the decision not to restructure the High-Energy Laser Technology Program management approach. (See pp. 23, 24, and 25.)

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AGENCY COMMENTS AND GAO EVALUATION

DOD advised GAO that it was implementing most of the Defense Science Board Task Force's technical recommendations but disagreed with the task force's recommended management changes and GAO's recommendation for an overall DOD level study of the high-energy laser program. (See p. 24.)

GAO continues to believe, however, that the Secretary of Defense should study the entire program to determine how a high-energy laser weapon, if developed, could best meet national security needs. Once these needs are determined, GAO believes the Secretary should redirect the program providing DOD level management and direction necessary to efficiently accomplish program objectives. (See pp. 24 and 25.)