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ZENITH STAR EXPERIMENT TO TEST LASER WEAPON IN SPACE

(Updating *Backgrounder* No. 557, "Technology Speeds the Strategic Defense Initiative Timetable," January 13, 1987.)

The Strategic Defense Initiative Organization, the Pentagon office running the SDI program, is planning to test a model space-based laser weapon that would destroy ballistic missiles in flight. Called the Zenith Star experiment, the goal is to test a laser weapon in space in the mid-1990s; if successful, such weapons could be deployed in the follow-on phases of a strategic defense system after the year 2000.

The Zenith Star experiment is designed to test the feasibility of putting a laser weapon on an orbiting satellite. The first series of experiments could begin in early 1995 and last about three months. They will test the satellite's sensors and targeting systems, calculating the ability of a satellite to detect and track targets simulating Soviet booster rockets or warheads. The second series of experiments also is scheduled to last about three months and will measure the characteristics of the laser beam, including its quality and its effect on simulated targets. The final series of experiments is scheduled to last six months and consists of more advanced tests of the satellite's targeting system. These experiments will determine the ability of the satellite to aim precisely at such fast-moving targets as rocket boosters, repoint the beam from one target to the next quickly and accurately, and detect and track targets at greater distances.

Distinguishing Warheads From Decoys. The spacecraft contains a large telescope and sensors to detect and track simulated targets and a large light-weight mirror to focus the beam on specially designed targets that are similar to ballistic missiles and warheads. The sensors must be sensitive enough to distinguish faint objects at great distances in space in order to distinguish between a real warhead and decoys. The Soviets are certain to employ decoys resembling real warheads to confuse and overwhelm the SDI system. The sensitivity of sensors required to distinguish between a real warhead and a decoy is what it would take to see a single candle from some two miles away.

The targeting system must also be able to track with precision fast-moving targets – specially designed test targets that have the characteristics of missiles and warheads. Absent this capability, the SDI system would be unable to direct the beam weapon against targets with sufficient accuracy. The targeting precision specification for the system is the equivalent of targeting a fast-moving beach ball from over 1,500 miles away. The spacecraft will point and aim the weapon from one target to the next in less than one second and produce a laser beam with the strength of a magnifying glass 400 feet in diameter. These capabilities, if successfully demonstrated, would give a deployed space weapon the capacity to destroy large numbers of missiles and warheads while in flight.

The spacecraft also contains an Alpha chemical laser generator. This would produce a laser beam by mixing hydrogen and fluoride to form hydrogen fluoride molecules. Mirrors then are to be used to extract an intense beam of light from the radiation emitted from the chemical reaction. For the purposes of the experiment, the generator must produce a beam of sufficient strength and quality to destroy simulated targets in space. Tests undertaken this April of a developmental chemical laser generator measured 2 megawatts of instantaneous power, the amount of electricity required to run 1,600 homes for a year. A more powerful laser suitable to the ballistic missile defense mission is to be adapted from this tested laser. Tests on the laser are to continue throughout the next year. The laser generator will be integrated into the Zenith Star experiment at the end of these tests.

Robust Soviet Program. The longer the Zenith Star experiment is delayed, the longer the United States will have to wait to evaluate the potential contribution that space-based laser beam weapons could make to U.S. national security. The Soviets, by contrast, have a robust program investigating the potential military uses of laser weapons. They are rapidly developing a laser weapon that could threaten existing U.S. communication and surveillance satellites, and that in the future could be applied as a defense against ballistic missiles. With the Soviets working on laser weapons, the U.S. cannot afford to delay programs like the Zenith Star experiment.

The Zenith Star experiment could be completed by as early as the end of 1995 for approximately $1.8 billion. Already, however, funding reductions and such technical problems as vibrations in the laser aiming system have delayed significantly the progress of this experiment. At one point in the mid-1980s, the launch date was set for 1990. Over the past two years only $44 million out a requested level of $150 million has been appropriated by Congress for the program. Contractors for the Zenith Star experiment are now concerned that fiscal 1990 funding may be cut by as much as 70 percent from the $235 million budgeted for the program by the Reagan Administration. With the recent action taken by the House of Representatives to cut the Administration's request for SDI by almost $2 billion, such drastic reductions in the budget for the Zenith Star experiment seem only more likely. Without about $325 million over each of the next five fiscal years, this promising SDI technology will go unfulfilled and important hedge against Soviet laser weapons research will be lost.

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