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Backgrounder

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TECHNOLOGY IS TURNING SDI THEORY INTO REALITY

(Updating Backgrounder No. 375, "Strategic Defense: The Technology That Makes It Possible," August 23, 1984.)

Month after month, the Strategic Defense Initiative is becoming technologically more feasible. In the past year, for example, breakthroughs in research have been so dramatic that they promise to cut a decade or more from the SDI testing time-table envisioned by the Defense Technologies Study Team, the so-called Fletcher Commission, which released its well-known report in 1984 concluding that ballistic missile defense was feasible.

Among these breakthroughs are:

1) The Chemical Laser: A chemical laser is a high-energy beam of concentrated light derived from a chemical reaction of the compound hydrogen fluoride. It is in an advanced stage of development and, if deployed, could be based in space to interdict Soviet missiles in boost-phase, post-boost phase, and mid-course. The Navy's mid-infrared advanced chemical laser (MIRACL) reached full operational status last September 6. It destroyed a ground-based Titan I missile casing pressurized and loaded to simulate flight conditions of operational Soviet missiles. The multipurpose chemical laser (MPCL) being developed by the Army is expected to require lower power, costs, and manpower to reach the same level of lethality.

2) The Free Electron Laser: This uses electrical energy to generate a laser beam of high intensity. The testing program has made exceptional progress at the Lawrence Livermore National Laboratory in California and the Los Alamos National Laboratory in New Mexico. Livermore scientists have generated a free electron laser beam at a peak power of one-billion watts. This is far greater power than the 20-million-watt level deemed necessary for an effective laser defense against Soviet missiles. Free electron lasers are important to SDI because they are energy efficient, are highly lethal against targets, and are less vulnerable to countermeasures than most other lasers.

3) The Railgun: Rapid progress has been made in testing the "gun," which uses electromagnetic energy to fire a projectile at incoming vehicles at extremely high speeds. This railgun has demonstrated its capability to fire its "smart bullets" at a rate of five per half second, considerably faster than the rate of one shot per two or three days of a year ago. Such a tremendous increase in the rate of fire over such a short time demonstrates the railgun's great promise in someday being able to stop incoming warheads by crashing into them.

4) The Rubber Mirror: This is a reflecting device which changes shape to sharpen the focus of a reflected laser beam. A test last September confirmed a critical breakthrough. By sharpening a laser beam's focus the "rubber mirror" can compensate for the dissipating effect which the atmosphere can have on laser beams. Because of this atmospheric effect, it was assumed that the lasers would have to be deployed above the atmosphere, on very costly satellites. The rubber mirror would permit the heavy lasers, along with their power and fuel supplies, to be based on the ground. This could mean that laser defenses may be deployable ten years earlier than expected.

5) The Scramjet: This advanced rocket engine is a cross between a rocket engine and a jet engine. A computer model of the engine recently confirmed that it will work. Plans call for using it in a "spacelifter" cargo aircraft capable of taking off from the ground, orbiting in space and returning to earth to land, all on its own power. This space cargo shuttle aircraft could reduce dramatically the cost of deploying strategic defenses in space. The scramjet could reduce costs of orbiting payloads by a factor of 100. With such cost reductions, the Soviets could never overwhelm U.S. strategic defenses by deploying additional offensive systems because the cost to the the U.S. of deploying additional defense would be very cheap.

6) Airborne Optical Adjunct: This experimental airborne early warning surveillance sensor system could identify and track ballistic missiles targeted against the U.S. The Army's ballistic missile defense Airborne Optical Adjunct tracking experiment is already in the development stage. Plans exist to test this surveillance sensor system on commercially available aircraft such as the modified Boeing 767 or the McDonnell Douglas DC-8. The program builds on technology already demonstrated under the Army's ballistic missile defense program.

Last year's bumper crop of successful tests of strategic defense technologies is bad news for critics who say that SDI will not work, or that it will be too expensive to deploy. SDI technology not only appears feasible, but possibly available at a low enough cost to make effective Soviet countermeasures highly unlikely. The feasibility of SDI is slowly and inexorably becoming not a matter of "if" but of "when."

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