"Star Wars" Tests and the ABM Treaty

Arguing that planned tests of components of a missile defense system will violate the ABM treaty, critics are trying to cut the program's budget

The first experiment in space for the Pentagon's "Star Wars" program was modest and a little embarrassing. An off-the-shelf, low-power laser was fired at a mirror aboard the space shuttle Discovery as it passed over a military base in Hawaii on 19 June. The purpose of the experiment was to demonstrate a key bit of the technology needed for the development of much larger, ground-based lasers, which may someday be used in conjunction with space-based mirrors to destroy Soviet ballistic missiles at a great distance. Because of a navigation error, however, the shuttle was pointing in the wrong direction and the laser missed the mirror. A second attempt on 21 June was more successful.

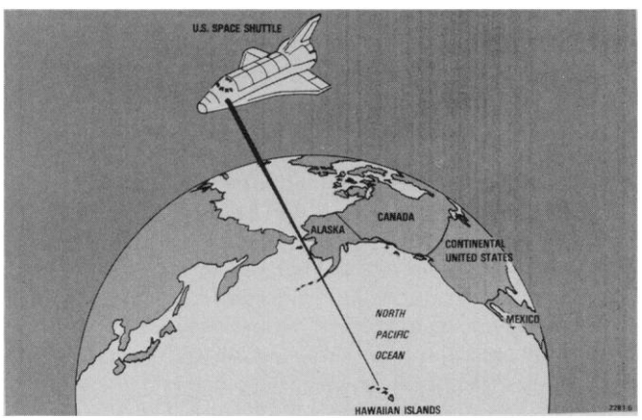
On the horizon are many more such experiments and demonstrations, each more elaborate than the one before. Between 1987 and 1992, for example, at least 12 flights of the space shuttle will be devoted in large part to "Star Wars" tests. Four major ground-based experiments are planned for the next 5 years; six more will occur within the earth's atmosphere; and four additional experiments are planned for space. They will incorporate a panoply of sophisticated, defensive weapons and sensors, including lasers, electromagnetic railguns, rockets, and infrared radars.

This list, a source of pride for the Pentagon, has recently provoked considerable anxiety within the Congress. Egged on by a substantial portion of the arms control community, a number of influential congressmen are worried that some of these experiments are illegal—banned by a prohibition in SALT I on development or testing of antiballistic missile (ABM) systems or components. Although the Administration has mounted a strenuous campaign to rebut this claim, it has not been entirely successful.

As a result, the proposed budget for the program in 1986 may be sharply cut, as critics attempt to force either a deferral or cancellation of the experiments through some drastic financial surgery. Recently, for example, it narrowly missed being slashed by 45 percent, from $3.7 billion to $2.1 billion, with most of the cuts in the long-lead items for major experiments. The proposal was made by Representative Norman Dicks (D–Wash.), who believes that "those who would call some of the activities contemplated . . . in line with the [SALT I] treaty would see a masked man at midnight stalking through an alley with a color TV under his arm as making a delivery." Dicks had the support, among others, of Representative Les Aspin (D–Wis.), who chairs the House Armed Services Committee. Along with a number of Senate supporters, including William Proxmire (D–Wis.), John Kerry (D–Mass.), and Albert Gore, Jr. (D–Tenn.), they intend to try again during appropriations votes later this summer.

Although the most controversial experiments are not scheduled until 1988, critics of the program are anxious to resolve the issue now, before major new contracts for test hardware are signed. "We are now moving into a time where the expenditures are building up quite rapidly because [we] are beginning to build experimental hardware, and that is where the costs are hard; they keep ramping up and will ramp up into the next year," Lieutenant General James Abrahamson, the program's director, told the House Republican Study Conference on 5 June. By early July, he will have selected four or five contractors to conduct detailed analyses of test requirements and schedules, out of ten who submitted proposals.

As many Administration officials recognize, the managers of the program face a difficult challenge. They must somehow conduct tests realistic enough to advance the technology and generate public support, yet remain within the treaty constraints, which were deliberately drafted to block such efforts. As Abrahamson told the study conference participants, "We have to be able to present . . . not esoteric laboratory data, but real demonstrations . . . the results of true experiments . . . so that it will be apparent not only to you but to your constituents, to our population and to the Western world and to the Soviet Union, as well, that this can be done." In a speech on 30 May, Arms Control and Disarmament Agency director Kenneth Adelman predicted openly that treaty modifications might be necessary for such experiments to proceed.



The first test

An attempt to bounce a laser beam off a mirror on the shuttle failed on the first try, but was successful on the second attempt.

For now, the Administration insists that everything on the books is legal. "The SDI [Strategic Defense Initiative] research program can be conducted in a fully compliant manner to reach a decision point in the early 1990's on whether to proceed to development and deployment of an SDI-related system," the Pentagon asserted in a special report on 18 April. Each of the proposed experiments has been formally reviewed and approved by the Pentagon's Office of Research and Engineering, which funds and directs the research, with legal advice from the Pentagon's general counsel.

Gerard Smith, the chief negotiator for the United States during the SALT I talks, is among those who have sharply criticized this review and its outcome. "When I read the Administration's report, I felt I was reading the work of expert tax lawyers, of people trying to evade the law," he says. "It seems to me

[that] we are trying to prepare the ground for [treaty] breakout and as a lawyer, I would say that constitutes anticipatory breach of contract." He is joined in this view by John Rhinelander, who served as the chief legal adviser to the U.S. SALT I delegation.

Specifically, they are critical of the Administration's interpretation of a provision in the SALT I treaty that prohibits development of space-based or air-based missile defense components. As Rhinelander points out, the provision was not discussed in any depth during the negotiations, so the key terms are subject to varying interpretation. But the U.S. government has previously defined "development" as field testing on so-called breadboard models or prototypes of equipment, readily observable by the other side,* and "components" as devices capable of acting as missile interceptors, launchers, or defensive radars.

Smith and Rhinelander say that the managers of the "Star Wars" program have sought to circumvent the spirit, if not the letter, of these constraints through field tests of devices that are barely different from components. Beginning in 1988, for example, tests will be conducted on a Boeing 767 crammed with infrared missile detection and tracking equipment as it flies over the Pacific Ocean. Virtually everyone agrees that such tests would be illegal if the data collected during missile tests were passed along to ground-based interceptors; the plane would then be acting as a defensive radar. But the directors of the program intend to omit the transmission equipment, and record the data onboard instead. Therefore, they hold, the experiment is not proscribed.

Similarly, the Pentagon plans to launch two infrared satellites between 1991 and 1993 to detect and track Soviet missiles with great accuracy, beginning shortly after their launch. Again, the program managers hope to steer clear of the ban on radar tests by omitting the equipment needed for prompt transmission of the collected data, as well as most shielding against radiation. "They will operate in as close to a realistic environment as possible," says William Frederick, an assistant director for sensor technology in the SDI office, "but they will not be militarized satellites, and they will be incapable of providing a guidance vector to space- or ground-based interceptors in real time."

Sidney Drell, a physicist and co-director of the Stanford Center for International Security and Arms Control, calls this a cynical viewpoint. "If these devices are comparable in every way to components of air- or space-based systems, except for communications equipment, then in the court of world opinion, we lose." A similar argument is made in a forthcoming issue of *Daedalus* by Abram Chayes, a Harvard law professor and former State Department legal adviser, and Antonia Chayes, a former under secretary of the Air Force.

Two additional "Star Wars" experiments planned for the early 1990's have

*Even though he negotiated the treaty, Gerard Smith says that he is still unsure exactly what a "breadboard model" is. The term apparently comes from the laboratory practice of attaching electrical and mechanical equipment to a slab of wood for experimental tests.

Soviets Play Tit-for-Tat

Last February, the Soviet Union delivered a note to the State Department alleging that the United States had systematically violated five different nuclear arms agreements. The complaint, one of four such broadsides leveled by the Soviets at the Reagan Administration, was not made in isolation. It followed within a few days the release of a U.S. report about Soviet noncompliance, and Administration spokesmen noted accurately that it had a distinctive tit-for-tat quality about it.

Where the United States had declared that Soviet behavior increases "doubts about the reliability of the U.S.S.R. as a negotiating partner," for example, the Soviets asserted that U.S. behavior had put in doubt "its intentions with regard to the existing arms limitation agreements and to reaching such agreements in the future." Where the United States had charged the Soviets with violating the SALT I treaty by constructing a radar at Krasnoyarsk, the Soviets alleged U.S. violations of SALT I in the Strategic Defense Initiative. Where the United States alleged potential violations of the Threshold Test Ban Treaty, the Soviets did the same.

By virtually every account, this obvious attempt to equate U.S. and Soviet actions across the board failed.

The only complaints that have generated substantive debate in the West are those involving highly ambiguous provisions of the SALT I treaty. Specifically, the Soviets charged that Minuteman missiles had been illegally tested as defensive interceptors, that enormous radars have been constructed to prepare the ground for a territorial missile defense, and that an additional radar has illegally been constructed at Thule, Greenland.

The first of these complaints refers to a series of tests in 1983 and 1984, known as the Homing Overlay Experiment, in which a modified Minuteman I was used to attack a mock ballistic missile over the Pacific. The Soviets claim this violates a ban on tests of "non-ABM" missiles in an ABM mode, while the Administration claims that the Minuteman I was modified so greatly that it was not really a "non-ABM" missile.

The second complaint refers to construction of two immense early-warning radars in Georgia and Texas. Together with existing radars in Massachusetts and California, they provide coverage for a good portion of the continental United States. The Administration claims that the radars are intended for early warning of ballistic missile attack, however, not missile defense battle management. Unlike the Soviet radar at Krasnoyarsk, they are also clearly near national borders and facing outward, as the treaty demands.

The third complaint involves the construction of a new phased-array early warning radar at Thule, which the Soviets object to because it is nowhere near the U.S. border. The Administration maintains that it is exempt from this requirement because it replaces an older radar. Because the treaty is silent on such modernizations, the Pentagon asserts they are permitted.

SALT I negotiator Gerard Smith says with regard to the Administration's defense of the Homing Overlay Experiment that "if the Soviets used this argument, we would say, boy, that's cheating." And John Rhinelander, the SALT I legal adviser, says about both issues that "the U.S. position is the better of the two, but it is anything but an open and shut legal case."

The allegations have been discussed, without resolution, at meetings of the U.S.–Soviet Standing Consultative Commission, established by the treaty as a forum for compliance disputes.—**R.J.S.**

also aroused controversy. Each involves a defense against antisatellite weapons, or ASATs, which may someday be used to assault space-based components of a "Star Wars" system. In one, miniature projectiles will be fired at simulated ASATs by a railgun. (The projectiles are accelerated by a plasma arc that flows between two copper rails.) In the other, small homing rockets will be fired at ASAT targets from a large platform.

The Pentagon maintains that the tests are legal because the projectiles and homing rockets are aimed at ASATs, not ballistic missiles; thus, the weapons will be incapable of acting as missile interceptors. But a number of critics, including Representative George Brown (D–Calif.), Thomas Longstreth of the Arms Control Association, and John Pike of the Federation of American Scientists, maintain that this is a trivial distinction, because the difference between ASATs and ballistic missiles in this context is slight.

In addition, they say, the Soviets might lack the means to verify that either the radars or the space-based rockets and projectiles lack a true capability to kill ballistic missiles. Even Frederick concedes this uncertainty. "I'm not sure how the Soviets will know," he says. "Perhaps there can be some agreed-upon method." But others are less optimistic and fear that advocacy of essentially unverifiable experiments will ultimately come back to haunt the United States. Abram and Antonia Chayes suggest, for example, that "in the case of dual-purpose technologies that might achieve but do not yet have ABM [antiballistic missile] capability, the intention of the party conducting the development will always be in doubt. This is especially so for the U.S.S.R., where weapons decisions are not subject to the requirement of public evaluation and justification."

Rhinelander, like the other critics, is no less worried about recent actions by the Soviet Union, including the deployment of an illegal radar at Krasnoyarsk (*Science*, 22 March, p. 1442). The trouble, he says, is that each side "tends to interpret the treaty strictly with respect to programs of the other, but permissively for its own."

The critics have also urged that in the meantime treaty compliance issues be subjected to review by several agencies, not just the Pentagon. In a comprehensive report released last March, Rhinelander, Pike, and Longstreth recommended in particular that the general counsel's offices at the State Department and Arms Control and Disarmament Agency "should play important roles in the early review of U.S. research and development programs."

Barring this, they suggest that a panel of outside weapons and arms control experts be appointed to monitor continually the treaty implications of "Star Wars" work. Although this idea was endorsed in April by a group of defense experts that included John Foster, a vice president of TRW, and Sidney Graybeal, a vice president of the Systems Planning Corporation, it has been resisted by the Administration and has yet to win congressional endorsement. Its backers have vowed to try again before the budget deliberations have concluded.

—R. JEFFREY SMITH

A $9.5-Billion Plan for Facilities

Efforts by the university community to secure a major commitment of federal funds to upgrade research equipment and laboratories are getting broader attention in the Congress. Representative Don Fuqua (D–Fla.), chairman of the House Committee on Science and Technology has introduced legislation that could pump an estimated $9.5 billion into U.S. college and university facilities between 1987 and 1996.

Fuqua's bill, "The University Research Facilities Revitalization Act of 1985," is not the first of its kind. Senator John C. Danforth (R–Mo.) and Senator Thomas F. Eagleton (D–Mo.) introduced broad-based legislation in June 1983. The series of bills covering university research and development facility needs were meant to serve as a blueprint for Congress to tackle the matter. Until now though, there has not been a strong interest in the House in taking on the issue.

And even with Fuqua now calling for Congress to take action, selling this package during a time when Congress is concerned with budget deficts and tax reform will be difficult. Indeed, Fuqua says he intends his bill just "to be a vehicle to develop consensus within the Congress." On the Senate side Danforth will be following suit with a "sense-of-the-Congress" resolution by late July and with his own legislative package in the fall. Neither Danforth nor Fuqua, however, expect Congress to move on their proposals until sometime in 1986.

Under Fuqua's bill, 10 percent of federal funds devoted to university R&D would be spent on facilities and equipment. This proposal could be explosive if it is perceived as depriving existing university R&D programs of funds. In fact, Fuqua does not propose this. To avoid penalizing research efforts, Fuqua proposes to hike federal spending for university research in 1987 by the following amounts: National Science Foundation, $100 million; Health and Human Services, $200 million; Defense, $100 million; Energy, $25 million; NASA, $20 million; and Agriculture, $25 million.

However, in the second through the tenth year of Fuqua's plan, this incremental funding would be provided only if universities and colleges can secure matching grants from states and the private sector. Under Fuqua's plan the six agencies would be required to reserve at least 10 percent of their university R&D obligations to facility modernization. This percentage could shrink only if university R&D were cut.

To help federal agencies and universities set priorities, the National Science Foundation beginning in fiscal year 1986 would conduct periodic assessments of university and college research facility needs. NSF already is slated to submit a separate report to Congress on university R&D needs by September 1986.

Fuqua's and Danforth's initiatives may help force Congress to focus on the issue of university facilities. "I think the whole thing has come a long way," says a lobbyist for the Association of American Universities (AAU). He notes that it has taken years for federal agencies to recognize that university and college research facilities were severely outdated.

The challenge though will be to shape a package that is acceptable to the Congress, industry, and the educational community. In the House and Senate, the legislation will be subject to the jurisdiction of multiple committees. "It could be a very easy bill to kill," comments the AAU lobbyist.—MARK CRAWFORD