

# B-1's Problems Stir Debate on Bomber's Role

*A new report on the controversial aircraft may rekindle an old debate over the merits of building bombers designed to strike deep into the Soviet Union*

THE AIR FORCE'S troubled B-1 bomber is back in the news and is likely to stay there for some time. A fierce dispute over the aircraft's capabilities is expected to erupt again on Capitol Hill this month when Congress returns after Labor Day for a pre-election session.

Although the dispute will focus on recent reports of a serious flaw in the bomber's sophisticated defensive systems, an underlying issue is whether the B-1's basic mission to penetrate deep into Soviet territory should be rethought. An alternative, which is being discussed by some B-1 critics, is to use the bomber primarily as a cruise missile carrier that would deliver long-range air-to-surface missiles from outside Soviet defenses.

Such a change in the aircraft's mission would, however, be fiercely resisted by the Air Force, which has long argued that penetrating bombers such as the B-1 and its proposed successor the "stealth" bomber, are needed to deliver large warheads to heavily hardened targets, conduct damage assessments of previous attacks, and search for targets such as mobile missiles. Moreover, it is argued that deploying penetrating bombers forces the Soviet Union to undertake costly improvements in its air defenses.

The issue is likely to come up during hearings on the aircraft planned by the House Armed Services Committee in the next few weeks. But it could be brought into sharper focus next year if, as expected, the Air Force proposes a variety of technological enhancements designed to counter anticipated improvements in Soviet air defenses. The enhancements could cost up to \$8 billion.

The outlines for the expected debate over the B-1's future appeared last month in a report by the Congressional Budget Office (CBO), a nonpartisan research arm of Congress.\* CBO provided detailed confirmation of a fundamental flaw in the B-1's computerized and supersecret electronic countermeasures (or ECM) system, which is a key

element in the bomber's ability to penetrate Soviet defenses. But it also examined the pros and cons of changing the plane's planned mission.

Controversy is nothing new to the B-1 (*Science*, 29 January, p. 452). The plane was originally sought by the Air Force in the 1970s as a successor to the aging B-52, whose ability to penetrate Soviet defenses was increasingly in doubt. The Carter Administration cancelled the B-1 program in 1977, however, arguing that using B-52s as so-called standoff bombers to launch cruise missiles from outside Soviet territory would be a more cost-effective option. Along with this decision, the Carter Administration agreed to pursue the development of the stealth bomber (now known officially as the B-2) to perform a deep penetration role in the 1990s.

The B-1 cancellation became an issue in the 1980 presidential campaign. Shortly after the election the Reagan Administration reactivated the program as part of a two-

bomber plan. The B-1 would be developed as a deep-penetration bomber for the late 1980s and early 1990s, until the B-2 is deployed. At that point, the B-1 would be used as a combined cruise missile carrier and penetration bomber. Congress signed on to the plan, and it was agreed that 100 planes would be built at a total cost of \$20.5 billion, in 1981 dollars.

The CBO study acknowledges that the B-1 program has been on time and that the total cost will be close to the agreed ceiling. However, the report confirms that there are several problems with the plane that have yet to be fully resolved. The most serious is a fundamental flaw in the ECM system, which is supposed to detect and counter radar-controlled Soviet defenses, including radar-guided missiles and the acquisition radars employed by Soviet fighters.

The ECM system is designed to determine the source and location of threats to the aircraft, sort them according to their seriousness, and transmit electronic signals designed to jam or deceive the Soviet radars. Problems have plagued the system from the start, but they became a serious political issue a couple of months ago. In July Representative Les Aspin (D-WI), the chairman of the House Armed Services Committee and a longtime critic of the B-1, announced that the ECM system may never perform properly.

The CBO report confirms the severity of the problem. The ECM system, it says, is unable to process a large number of radar signals simultaneously, which means that



Rockwell International Corporation

**Flying into heavy weather.** Proposals for enhancement of the B-1's capabilities could force a debate over the aircraft's future role.

\*The B-1B Bomber and Options for Enhancements, Congressional Budget Office, August 1988.

"the defensive avionics could be overwhelmed in a high-threat environment." The flaw, moreover, lies in the basic "architecture" of the system; it cannot be fixed by software modifications alone.

The Air Force is now looking at ways to improve the ECM system, including a reduction in the number of radar bands that it processes. This "might . . . salvage the capability of the current defensive avionics against the most important air defense threats while keeping the system from being overloaded in a high-threat environment," the CBO report says, but the system may never achieve the level of performance called for in the original specifications.

Another serious problem, which would prevent the aircraft from conducting very deep penetrations now, is that it can fly only about 1300 miles when it is fully loaded and hugging the ground to evade detection. A round trip from a safe distance outside Soviet defenses to Moscow and back is about 2000 miles. CBO notes that the Air Force is pursuing two fixes that will permit the plane to carry more fuel. The first, which has been fully tested, will add about 500 miles to the range. The second, which "is based on preliminary engineering evaluations and could change substantially," could add 1700 miles. If the fixes work, the B-1 fleet should be retrofitted by June 1990.

The Air Force has taken the position that these problems, although serious, would not prevent the bomber from carrying out its assigned missions. Its other attributes, including the ability to fly fast and low, a small radar cross section, and high maneuverability, would get it through existing Soviet defenses, the Air Force says.

However, the Soviet Union is beefing up its defenses, and the CBO says that, in addition to fixing the current problems with the B-1, the Air Force may propose a package of enhancements designed to counter these developments. In most weapons systems, such enhancements are almost routine, but in the politically charged atmosphere surrounding the B-1, they are far from it. Aspin has already announced that "we have to decide first whether it is worth it to fix the B-1's problems."

If Congress decides not to provide funds to fix the problems or enhance the B-1's penetration capabilities, a possible option would be to convert it to a standoff bomber. The CBO explored this option at the request of the Armed Services Committee. It noted that some money would be saved by forgoing the proposed enhancements, but offered no recommendations.

For now, however, Aspin is simply warning that the next fiscal year "is the make-or-break year" for the B-1. ■ COLIN NORMAN

## Technology and the Schools

Two million computers have been installed in U.S. schools in the past decade, and virtually every school in the country now has at least one, according to a new study by the congressional Office of Technology Assessment (OTA).<sup>\*</sup> Yet, in spite of this impressive record, the information revolution that has transformed some sectors of American industry and commerce has barely begun to change precollege education, OTA notes.

The study is quick to acknowledge that technology is not the sole remedy for what ails American education. Nevertheless, the report points to many examples where well-funded, sustained support of new education technologies in individual schools has led to improvements in students' achievement. But, with less than one computer for every 30 students in the average school, and access limited to under 1 hour per week for each student, the technology is far from becoming a standard classroom feature, the report notes.

"What we have seen after 10 years is the evidence of a great opportunity," says Michael Feuer, one of the authors of the OTA report. But the opportunity is being limited by a variety of barriers at every level, including shortage of funds, lack of support systems for teachers, a bewildering array of software of generally poor quality, and "erratic and disorganized" federal policy for research on education technology, the report concludes.

At the current rate of investment, "the Nation can expect a continued broad base of experimentation in some schools, steady but slow improvement in software, and spotty access to the technology by children." Stepped-up investment is needed.

Although OTA offers no recommendations on the desired level of computerization in the schools, it calculates that about \$4 billion a year would be required to provide a computer for every three children. This compares with an estimated expenditure of about \$200 million a year on computer hardware over the past decade.

More computers, of course, would not by themselves improve precollege education. OTA points to the critical need to provide more support and training for teachers. It points out that only about one-third of the nation's teachers have had even 10 hours of computer instruction, and that less than one-third of recent education school graduates consider themselves prepared to teach with computers.

As for software, there are an estimated 10,000 products on the market, OTA notes, but quality generally leaves much to be desired. Publishers tend to "play it safe" and offer only what they believe teachers will buy, and state programs for reviewing and evaluating software could be greatly improved, the report says. The federal government could also play a role here by underwriting more software R&D.

A "clear message" to emerge from the study, says Linda Roberts, who directed the effort, is that "effective use of these tools is a national issue, and we need national leadership." Some of the report's strongest criticism, however, is directed toward the federal R&D efforts. The federal government currently spends about \$240 million a year on educational R&D, but more than \$200 million of the total is accounted for by the Department of Defense; only about \$30 million in federal funds is spent on R&D aimed at developing technologies for precollege education, OTA estimates.

The report notes that the National Science Foundation's budget for all science education activities took a nosedive in the early 1980s and has only recently begun to recover. The first new grants were not made until 1985, and the results are only now beginning to percolate through the system.

The Department of Education, in contrast, emphasized technology in the early 1980s but later neglected it. Former Education Secretary Terrell Bell launched a new "Technology Initiative" in 1981 that resulted in a variety of computer projects and the establishment of a new Educational Technology Center with a budget of \$7.7 million over 5 years. When Bell left in 1984, however, "the new Secretary, William Bennett, did not share Bell's vision of improving education through technology. The climate in the Department, reflected partly in the declining number of new grants involving computers, shifted significantly," OTA reports. The department has, however, decided to support the Educational Technology Center for another 5 years—though with a reduced budget.

■ COLIN NORMAN

<sup>\*</sup>Power On! Office of Technology Assessment, September 1985.