

Military R&D: Technology on the march

In the newly issued Federal research and development budget for fiscal 1977 (SN: 1/24/76, p. 52), \$11 billion, not quite half the total, is devoted to military programs. The appearance before Congress last week of Malcolm R. Currie, the Director of Defense Research and Engineering for the Department of Defense, offered insight into the major projects being emphasized, as well as a carefully veiled glimpse of some awesome new technologies for future weapons systems.

The \$11 billion budget request represents a seven percent increase over present funding, but falls \$1 billion short of what Currie called "a fully justifiable program." Overall R&D investment has fallen proportionally in recent years to some 30 percent of the defense budget, he said, but the proposed expenditures for fiscal year 1977 would reverse that trend. If current trends are not reversed, Currie warned, "The Soviet Union can achieve dominance in deployed military technology in the 1980's." He said the Soviet Union leads in several vital defense areas, including strategic air defense systems, antiship missiles, chemical warfare and some areas of research into high-energy laser systems.

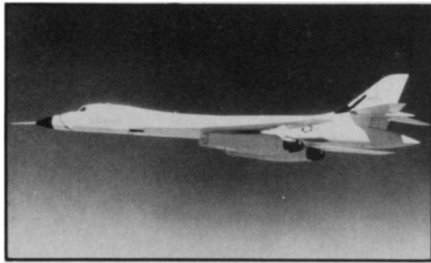
In response, the United States has several new major military systems emerging through the R&D process:

- The M-X advanced intercontinental ballistic missile (ICBM). The M-X is designed to counter a perceived Soviet threat of being able to knock out present-type ICBM's in their silos in the 1980's. The M-X (budgeted for \$84 million) could carry heavier payloads with greater accuracy, but more important, it could be transported horizontally from place to place for erection and launching from undetected sites.

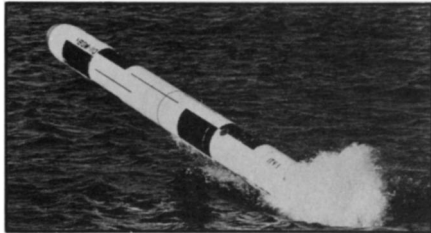
- The cruise missile. Already a controversial topic in the disarmament negotiations (SN: 12/13/75, p. 376), the missile can be launched from a bomber or a naval vessel. Taking advantage of U.S. technological superiority in guidance and propulsion techniques, it can streak along at low altitudes following local terrain with an on-board computer. The air-launched version (budgeted for \$79.2 million) is scheduled for first powered flight later this month; the sea-launched version (\$182.5 million), for flight in May.

- The B-1 bomber. A prototype is flying, but so is the fur—critics call it a flying white elephant that will be obsolete when it goes into service (in the 1980's). Costs have skyrocketed (the budget request this year is \$482.7 million). Proponents emphasize the increased probability of penetration into enemy territory because of a multitude of sophisticated defense systems.

- The space shuttle. The National



B-1 bomber prototype: The fur is flying.



Cruise missile: Low-altitude streaker.

Aeronautic and Space Administration is in charge of building the shuttle, which should have its first operational flights in 1980. But the Defense Department is preparing to use it to help launch a variety of military satellites and "explore ways in which man can contribute in the far term to the effectiveness of military space systems." Total shuttle-related military expenditures through FY 1981 are expected to be \$1.45 billion, with the option for another \$700 million to modify equipment at Vandenberg Air Force Base to launch the shuttle from there (the optimal site for launches into polar orbit).

- The NAVSTAR system of satellites for navigation. By 1980, 12 navigational satellites are planned, with a dozen more to follow over the next few years. The system (current request \$78.5 million) is supposed to enhance capability in missile guidance, blind bombing, troop move-

ment and routine navigation.

Currie's testimony also revealed the state of several new technologies that may soon find their way into practical weapons systems:

- Lasers. A major problem has been how to deflect or steer laser beams; recent experiments have demonstrated a way of doing this with high pressure gas streams. One of the more intriguing changes for bureaucracy-watchers was an announced shift of responsibility for coordinating the entire laser weapons project directly to Currie's office, where an Assistant Director will oversee active projects now being pursued by all three armed forces (to the tune of \$187 million this year—up 20 percent).

- New goggles that allow foot soldiers to see at night without artificial illumination have been demonstrated (earlier systems were too bulky).

- A low-volume ramjet engine was tested in full-scale flight, opening up "a new era in missile propulsion," with faster speeds and greater ranges.

- Remotely piloted vehicles are now equipped with imaging systems and lasers to provide reconnaissance information and laser direction for a new generation of "guided projectiles."

- New ceramics for gas turbines may increase fuel efficiency by 25 percent and double the maintenance-free lifetime of such turbines.

- New sensors for satellites will allow background suppression and contrast enhancement of ground images to be done on-board before relaying the pictures to a commander; concept feasibility was demonstrated last year.

- SEAGUARD—an acoustic system that can listen to sounds made underwater *thousands* of miles away, discriminate them from background and provide location of the source.

- "Speculative projects" like X-ray lasers; Currie didn't elaborate. □

Concorde trial gets DOT approval

In what is likely to be one of the most important steps in the development of commercial transportation by supersonic aircraft, U.S. Secretary of Transportation William T. Coleman Jr. last week opened the door to the Concorde. It is only for a temporary period—16 months of commercial operation, to encompass all four seasons plus four months more for "data analysis." But the decision was hailed by proponents of the Anglo-French SST, some of whom described the trial period as being even longer than they had expected. Environmentalists were far less pleased.

Coleman's decision allows as many as six SST flights per day to land in the United States: two each by British Airways and Air France at New York's John F. Kennedy Airport and one each at Dulles Airport in Virginia. Landings and takeoffs on



The Concorde landing at Dulles in 1973.