
Science & Technology

The military needs the Space Shuttle

by Marsha Freeman

Over the past six months, a brouhaha has broken out in the press over the military's supposed abandonment of the Space Shuttle. This stemmed from the Air Force's decision to continue to keep a supply of expendable launch vehicles available to meet national security needs. Expendable launch vehicles, or ELVs, are the one-time rockets that have been used for military and civilian launches for the past 25 years.

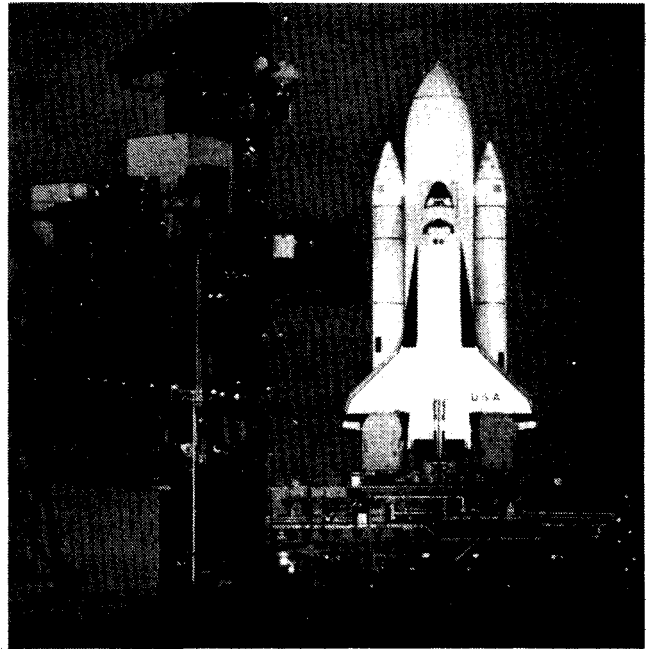
Charges have been made that the Air Force is undermining the future of the Shuttle by planning to launch certain payloads using ELVs. *Science Magazine* on June 29 went so far as to say that the military "is preparing to jump spaceship, only three years after the shuttle's first flight."

The Air Force has stated that ELV launchers will be cheaper to use than the Shuttle. "Cost-effective" defense, which became national policy under former Defense Secretary Robert McNamara, is no defense at all. The problems that the Shuttle does have are, by and large, the result of underfunding during its development.

If both the military and civilian space programs were funded at levels that maximized both national security and the most advanced civilian technology, the cost would be meaningless compared to the economic spinoffs to the overall economy.

The issue of whether the military will continue to use expendable vehicles appears to be the result of an idiotic policy decision made in 1977 during the Carter administration which stated that the Air Force would rely solely on the Shuttle for access to space. Defense Secretary Weinberger had the policy reviewed in February and decided that U.S. national security could be compromised if that policy stood.

The change in policy, to maintain the option of using



ELVs if warranted, produced an immediate negative reaction from NASA, which has planned out its payload manifest for the next five years assuming the Defense Department will account for about one third of the Shuttle's cargo. Since the price of launch is very sensitive to the rate of launches, NASA fears price increases may be necessary if the DOD pulls a large number of their payloads out of the Shuttle.

The entire issue should be resolved according to what launch capabilities are necessary to maintain U.S. national security, and should include both a robust Space Shuttle fleet, and expendable launch vehicles for specific missions.

The Air Force and the Shuttle

Despite its complaints that the Shuttle has a longer turnaround time than projected when it was being developed, the military has been unable, so far, to keep to *its own* planned schedule of Shuttle launches, due to the failure of one of its upper stage rockets attached to a payload in the Shuttle last fall, and the failure to have important experimental payloads ready on time. The lack of the Air Force's support for the Shuttle program has itself been a factor in lessening the ability of the Shuttle to meet national security needs.

The military's complaint that there are not enough orbiters in the fleet to assure ready access to space, ignores the fact that the Air Force never backed NASA in securing funding for an additional, fifth orbiter. The fact that the Shuttle may have a higher launch cost than ELVs will only be aggravated if the military itself switches payloads that could be flown on the Shuttle to ELVs.

It is in the interest of the military to make sure that the Shuttle system is fully operational and economical, and this

requirement should supercede any short-sighted decision to "save money" by using ELVs, since the Shuttle is still undergoing improvements to streamline operations, which will ultimately reduce cost.

Regardless of the criticisms of the currently operating profile of the Shuttle fleet, the military will need the manned capabilities of the Shuttle for the check-out, launch, and repair of military satellites that are larger, more expensive, and more complex than the current generation of technology.

The payload capacity of the Shuttle's cargo bay has been designed to accommodate larger, next-generation military satellites, such as Milstar, which would not fit on top of expendable rockets. If one of these highly complex satellites develops problems in space, without the Shuttle, the only option is to junk it and launch another one.

The recent in-orbit repair of NASA's Solar Maximum Mission scientific satellite demonstrated how important space assets can be repaired in space or returned to Earth for repair. At some time in the future, it is likely the military will take advantage of this manned capability.

Military and civilian satellites can also be checked out in the payload bay by a Shuttle crew for any possible damage suffered during the Shuttle launch. Repairs made on the Shuttle could then prevent a satellite from being deployed uselessly.

As crucial directed-energy beam-weapon technologies are developed, the Shuttle will provide the platform from which systems will be tested in space. Before the advent of the Shuttle, new space technologies had to be incorporated into multimillion-dollar independent spacecraft to be tested *in situ*. The Shuttle crew can take experimental pointing, tracking, laser, and other components of beam-weapon systems along in the cargo bay, test them, and bring them back for improvements.

When these systems are deployed, manned space stations and the orbiter fleet will be needed to keep them operational and to update the technology.

The decision by the Air Force to maintain an ELV fleet, along with the often self-serving criticisms it has made of the Shuttle program, has opened the door for general haranguing of the program for having a "terrible track record" and not living up to the promises NASA made in the 1970s. For the military, both the Shuttle and ELVs are required for national security.

Why ELVs are necessary

Time can be a crucial factor in launching military satellites. If an important communications, reconnaissance, or navigational satellite stopped working unexpectedly, it could be necessary to quickly launch a replacement. If a crisis erupted and additional communications or other capabilities were needed immediately, it would not be desirable to wait until the Shuttle were readied for launch.

Because the military, unlike the civilian sector, has cer-

tain capabilities in orbit which it must maintain at all times, even a success could disrupt a Shuttle launch schedule, since NASA must plan Shuttle payloads far in advance. For example, a military satellite which outlasted its expected lifetime could "have a complicating impact because it would delay the launch of a replacement satellite in unpredictable fashion," stated Air Force Undersecretary Edward Aldridge at hearings in February.

Because the Shuttle is a manned space system, it can only begin a mission when there is no possibility of any threat to the crew. The Shuttle pad launch abort in June demonstrated that NASA's very conservative launch profile will automatically stop the mission even if there is a high probability that nothing will actually go wrong. An expendable rocket can be launched quickly with less caution since the most that could be lost is the payload.

The Shuttle, using volatile liquid hydrogen to be able to carry up to 65,000 pounds of payload into orbit, takes hours to fuel. A solid-fueled rocket can be ready on the launch pad at any time, and blast off whenever necessary. The Shuttle is also a weather-dependent system which must have adequate visibility not only at the launch pad, but at various launch abort sites in case there is need for an emergency landing.

During a crisis or conflict, it would not be advisable to send a manned vehicle into space to launch payloads or do anything else. The Shuttle has not been designed to be survivable in a hostile environment and neither the crew nor payload could be protected in the face of anti-satellite or other weapons.

The Air Force could play an important positive role in pushing Space Shuttle operations and technology forward. Next-generation expendable launch vehicles which the Air Force is investigating could be developed from components and technology derived from the Space Shuttle itself. Industry contractors have already done preliminary designs of Heavy-Lift Launch Vehicles, which would be unmanned and carry perhaps double the tonnage of the manned orbiters.

If the Air Force itself began work, or worked with NASA, on this second-generation Shuttle technology, both the military and civilian programs would benefit. NASA plans to develop this capability in the future, which could be used for larger space station components, raw materials needed for long-duration manned missions and supplies for the space station, and large space-launched vehicles for manned planetary missions.

In his Feb. 23 testimony before a congressional committee, Aldridge stated that the "DOD remains fully committed to reliance on the Shuttle as our primary launch means. The use of the ELVs to complement the Shuttle would not be a substitute for a viable orbiter fleet." The Air Force should join with NASA in lobbying for a fifth orbiter, to make the fleet "robust" enough for all national needs, and push the state of the art technology for space to new frontiers.