Science & Technology

Space program needs new launch vehicles

by Marsha Freeman

By the year 2000, citizens from all over the world should be traveling to the Moon. Before then, the United States and its allies should have deployed a directed-energy defense system to wipe out the threat of nuclear war. These projects will require the development of new launch vehicles, both expendable and reusable, both manned and unmanned, both military and civilian.

The current Space Transportation System, based on the Space Shuttle, cannot go outside of low Earth orbit, about 300 miles above the surface of our planet. Its payload capacity is limited to 65,000 pounds, and does not meet all of the requirements for military deployments because it is a manned system.

Even before the end of this decade, the Strategic Defense Initiative (SDI) program will place new demands on space launch capabilities. The Air Force estimates that by the late 1980s the expendable rockets that they have used for the past decades will have to be superseded. The SDI will likely require the deployment of large structures, such as mirrors, in Earth orbit. There is a possibility that the Moon itself may be an important listening post in the future to make nuclear war obsolete on Earth.

Today we have no way to get people to the Moon or even to geosynchronous orbit 22,300 miles high, where our military and civilian communications satellites might need repair or retrieval. The White House has directed the National Aeronautics and Space Administration (NASA) and the Air Force to do a study leading to joint development of a second-generation Space Shuttle system. Second-generation expendable launch vehicles, or ELVs, are also on the horizon.

The current Space Shuttle is a good starting point for the development of a new class of launch vehicles needed to take not only astronauts, but huge payloads into space. Such payloads could be anything from lunar freighters to lasers and mirrors for strategic defense. Many would not require a manned crew, and would only tie up a Shuttle orbiter needed for manned missions if used just to haul freight. In the case of military deployment, many missions would be better unmanned.

At the present time, the largest expendable payload carrier is the Titan 34D rocket, which can deliver 4,000 pounds to geosynchronous orbit. The Air Force estimates that by 1989 it will need a launch vehicle that can deliver 10,000 pounds. By the turn of the century, estimates are that the military and NASA would have payloads of up to a quarter of a million pounds to take into space, far exceeding current Shuttle capabilities.

For the past year, the Air Force has been evaluating how it should meet this 10,000-pound payload requirement for the late 1980s. Unfortunately, both the Defense Department and the White House have decided, against the advice of NASA and the Congress, to modify the old Titan for this purpose. The alternative would be to start now on the more capabale and expandable Shuttle-derived technology, which will be needed in any case to meet the much greater requirements past the turn of the century.

This decision by the Air Force, if not changed by the Congress, could delay the development of Shuttle-derived ELVs, which will clearly be necessary beyond the next 15 years.

A number of aerospace companies have been looking in to a Shuttle-Derived Launch Vehicle. The Space Shuttle's main engines are the most powerful machines ever built. Each one delivers the equivalent energy of seven Hoover Dams. These liquid hydrogen engines could be used, with their external liquid hydrogen/liquid oxygen tank, with cargo carriers attached to the bottom of the tank.

The solid rocket boosters that are used with the Shuttle now could also be the basis for a Shuttle-Derived Vehicle. There is a possibility to "mix and match" the booster and hydrogen engine components to come up with various configurations, depending upon how much lift is required.

In an interview with *Space World* magazine in 1982, the head of NASA, James Beggs, said the space agency was interested in large solid rocket boosters. "The United States might want to go back to the Moon one day," he stated. "It would be relatively inexpensive to develop a very high-lift booster, and the solid rocket boosters would be a good candidate for lifting a half-million pounds into space," Beggs stated.

Over the last two years, the push for a manned return to the Moon has been gaining support in the space agency. In congressional testimony on Feb. 28, Dr. John Martin, NASA associate administrator for aeronautics and space technology, included a lunar base in his outline for future NASA missions requiring new technology. Dr. Martin placed the lunar base in the post-2010 time frame, which is further away than necessary; it is, however, a new component of NASA's long-range technology plans.

The space station will be the enabling technology to take man past low Earth orbit. It will provide the space infrastructure to do the military and civilian missions in the future. When stations have to be supplied, and large pieces of equipment have to be delivered to space, next-generation expendable launchers will be the workhorses to do the job. They will make today's Space Shuttle look very small, by comparison.