Soviet Shuttle Readied for First Space Flight

A look-alike of the U.S. shuttle, it may be launched in mid-November; the big question is, what is it for?

SEVEN YEARS AFTER THE VIRGIN FLIGHT of the U.S. space shuttle, the Soviet Union has rolled out its own duplicate shuttle and is preparing to fly it. While experts in the United States have had a better look at the Soviet machine recently, they remain confused about its purpose. Some think it will be used to bring heavy payloads down from orbit to earth for refurbishing; some say it will be used to supply a new and bigger space station in the 1990s; and some see it as a boondoggle.

The first of the new Soviet orbiters—dubbed "Buran" or "snowstorm"—was scheduled to go aloft on 29 October. A computer stopped the launch at the last minute when a gantry failed to disengage from the rocket. The Soviets say they will try again in mid-November.

In the initial test, Buran will be launched without a crew, guided entirely through its flight by computer. U.S. Air Force Secretary Edward C. Aldridge, who toured Soviet space facilities last summer, was quoted recently as saying the Soviets are a decade behind the United States in this area of technology. This makes it all the more impressive that they would fly this complex system with no human aboard to compensate for mechanical errors. The U.S. shuttle could fly unmanned, and earlier this year, the National Aeronautics and Space Administration (NASA) considered making the instrument changes that would enable the shuttle to fly without a crew. NASA was concerned about keeping military satellite launches on schedule and briefly entertained the idea of using leftover booster rockets of the old design on an unmanned launch. But the shuttle never has been tested in an unmanned mode, and the studies have been set aside.

One space watcher calls this the riskiest Soviet launch since Sputnik: not only will the shuttle be fully tested for the first time, but the giant propulsion system known as "Energia" will be making its first flight with a real cargo. The orbiter has been flown in the atmoshpere with detachable jet engines before, but it has not yet traveled in space.

Its lifter, Energia, consists of a four-engine hydrogen rocket and four "strap-on" kerosine boosters. This complex, modular arrangement permits a variety of uses and also, according to the Soviets, allows the system to reach orbit even if one of the boosters fails to work. A booster failure on the U.S. shuttle would almost certainly lead to disaster. Energia has been flown only once, in May 1987. On that trip the rockets worked perfectly but a test payload failed to reach orbit, dropping into the Pacific Ocean instead.

While the Soviets have said little about the purpose of the shuttle, Western experts have not been so reticent. Buran is a glaring example of "me-tooism," says James Oberg, a Houston aerospace engineer and author of *Uncovering Soviet Disasters*. Buran was begun under the regime of Leonid Brezhnev, whom Oberg describes as a "missile nut" and a patron of military space. In paranoid fashion, Oberg says, Soviet leaders assumed that the U.S. shuttle had a covert military purpose, particularly because the economic justification looked like a "cover story."

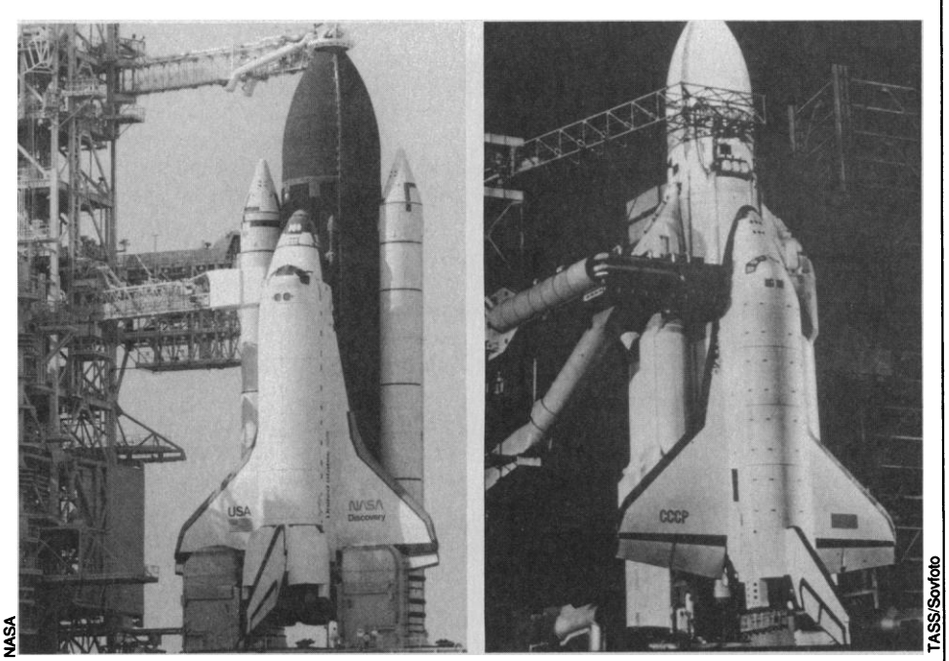
Oberg claims that the design, the propulsion system, and the crew for the Soviet shuttle were all developed outside the space centers that put the Mir station into orbit. The crew members identified thus far, he claims, do not come from the traditional cosmonaut corps but are test pilots recruited specifically for the job. (In a stroke of bad luck, two of the three identified so far died suddenly within 12 days of each other last summer, one of a brain tumor and the other in a plane crash.) "There are useful things you can do" with the Soviet craft, Oberg says, but he thinks the Soviets have spent twice as much to build a shuttle as the United States did, and yet its mission remains unclear.

John Logsdon, director of the Space Policy Institute at George Washington University, also says the Soviet shuttle is "a puzzlement." He thinks it may be "a program that was started with Brezhnev and developed a life of its own. . . . There seems to be an element of mirror action-reaction in it."

In October, anticipating a successful launch, the Soviets released photos of Buran on the pad. The images reveal a fairly close copy of the U.S. shuttle, with a few changes that will make it more versatile. The following details were noted:

■ The U.S. and Soviet shuttles have roughly the same dimensions, but the Soviet version can carry a heavier payload because its propulsion system is more powerful. The U.S. shuttle was meant to carry 65,000 pounds to low-earth orbit but with new safety modifications, it can lift only 40,000 to 50,000 pounds. The Soviet shuttle can carry 65,000 pounds.

■ The U.S. shuttle was supposed to fly 60 flights a year, but is now expected to make 8 to 14. The U.S. main engines were installed



NASA TASS/Sovfoto

Me-tooism? *The Soviet shuttle (right) resembles its U.S. counterpart in more ways than one.*

in the orbiter (not the launcher) so that they could be flown back to earth and reused. The Soviets put the engines on the rocket, simplifying and lightening the orbiter. (Some speculate that internal equipment, such as the electric system, is more massive than the fuel cells used on the U.S. shuttle, and that this may reduce the weight advantage.) There have been conflicting statements about the reusability of the Soviet engines, but Western commentators assume they will be essentially thrown away on each flight. "With only eight to ten flights per year, it's cheaper to throw them away," says Jerry Grey, director of science and technology policy for the American Institute of Aeronautics and Astronautics.

■ Putting engines on the Energia rocket has another advantage: it makes it usable without the orbiter and crew, so that it can be available for heavy, unmanned cargo trips. "If we had thought that one out more carefully we might have done the same," says Grey. It provides more flexibility. NASA has commissioned design studies for a U.S. unmanned cargo vehicle called Shuttle-C.

■ The wings of the Soviet craft are slightly forward of those on the U.S. shuttle. There are minor differences in the vertical tail stabilizer, the payload bay, the nose, and the windows. The crew compartment looks bigger. The Soviet stabilizer is split into two panels, allowing an extra measure of redundancy in steering, but also adding complexity. One expert sees this as an indication that the Soviets have less confidence in their controls.

■ Both shuttles use tens of thousands of ceramic tiles to protect against overheating during reentry, but one report indicates that the Soviets have used a more porous, whisker-like ceramic. *Aviation Week and Space Technology* reports, however, that the basic tile technology has been taken from U.S. research.

■ The overall Soviet design should permit a smoother landing, says Oberg, but also a faster one, making the final touchdown riskier.

■ Both shuttles have identical, large, delta-shaped wings. Early U.S. blueprints called for a small, straight-winged vehicle that might have cost one-fourth as much as the one that was built, according to Grey. The big bay and wings were added to satisfy military requirements that the shuttle be able to carry large loads and have a wide "cross-range" or ability to land at airstrips hundreds of miles off-center from the orbital path. This provided more flexibility. But by 1984 the U.S. Air Force began hedging its bets on the shuttle by purchasing unmanned rockets. Since then the Pentagon has mothballed its West Coast shuttle base. Thus, even as the United States demonstrated that its shuttle would have a limited military role, the Soviets copied a wing design based on military requirements. This suggests that the Soviets consider a big cross-range essential or that they do not have enough confidence to try an original design.

John Pike of the Federation of American Scientists speculates that the Soviets would like to build five orbiters eventually. They would add a new capability to bring heavy payloads down from orbit, and Pike suggests that in the mid-1990s they might be used to build and supply a large new space station.

"I just don't see any use for it yet," says Grey. "They must be planning to do something very impressive."

The Soviets will reveal their plans in time. But one top official—Roald Sagdeev, director of the Soviet Space Research Institute—has already tagged the U.S. shuttle, and by extension, the Soviet shuttle, as a bad investment. In a scathing article on the "bureaucratization of science" in the summer 1988 volume of *Issues in Science and Technology*, Sagdeev writes: "The U.S. space scientists must wait for the expensive and much-delayed shuttle to lift their payloads into space. The U.S. aerospace industry, like the Soviet industry bureaucracies, used its influence to subvert the logic of science." He concludes, "We have put too much emphasis on manned flight at the expense of unmanned efforts that produce more scientific information at lower cost."

■ ELIOT MARSHALL

Technology Legislation Previewed

A bipartisan task force, consisting of 16 members of the House Committee on Science, Space, and Technology, has outlined a broad set of legislative proposals designed to boost American technological competitiveness.* The proposals, which collectively would result in a stronger federal role in the development of commercial technology, are likely to appear next year in specific pieces of legislation.

The proposals are the fruit of an 18-month study launched last year in response to mounting concern over the ballooning trade deficit—an imbalance that the task force notes is growing by more than $340 million each day. In general, the task force is recommending more industrial input into federal policy-making related to commercial technology, as well as more direct government support for industry in the areas of product design, development, and manufacturing—areas that the Reagan Administration initially argued should be the responsibility of the private sector. "Industry just hasn't done it," says Ronald Williams, who directed the staff work for the study.

Among the proposals are the following:

■ **A new government body.** Reflecting general dissatisfaction with the current arrangements for establishing technology policy, the task force calls for a new organization to advise the President and Congress on federal research and development priorities. The exact nature of such an entity is not spelled out, but the task force says it considered arrangements ranging from a new Department of Science and Technology to an expanded Office of Science and Technology Policy. The structure will be worked out when specific legislation is drafted.

■ **Support for consumer electronics.** Because the consumer electronics industry "has essentially been surrendered to the Japanese," a bold initiative is needed, the task force says. It calls for the establishment of a National Advanced Technology Center for Consumer Electronics that would work with the private sector on joint development projects. In particular, the task force points out that American manufacturers are unlikely to be able to compete in the market for high definition television, a key technology that will pave the way for a variety of applications including education and personal communications.

■ **Construction technology.** The construction industry is investing in new technology at a level "far below the minimum needed to stay abreast of other industrial nations." Consequently, the task force suggests that the Corps of Engineers should get involved in civilian R&D programs likely to benefit the private sector.

■ **More freedom for federal labs.** Echoing an oft-repeated suggestion, the task force calls for more interaction between the federal laboratories and the private sector. In particular, it recommends that lab directors and personnel be given far more autonomy in cutting deals with industry to avoid the lengthy delays involved in going through Washington.

The task force was headed until earlier this year by Representative Buddy MacKay (D–FL). When he decided to make a bid for the Senate, Representative George Brown (D–CA) took over. ■ COLIN NORMAN

**Technology Policy and Its Effect on the National Economy*, House Report 100-1093.