

Goal: 2d Trip in 6 Months And 100 in Ship's Lifetime

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Special to The New York Times

EDWARDS AIR FORCE BASE, Calif., April 14 — With the nearly flawless completion of the voyage of the shuttle Columbia, space agency officials began today to draw up firmer plans for the future of man in space, a future that they had always envisioned with a clarity that left their critics scoffing.

The triumph of the Columbia is expected to lead to flights with far-reaching commercial, scientific and military applications.

An agency official said at a briefing this afternoon that the Columbia would probably begin its return flight to Cape Canaveral, Fla., riding piggyback on a Boeing 747 jet in about a week.

He said that the "optimistic" estimate was that the shuttle would fly again under its own power in "less than six months" on a four-day flight from which it might be able to turn around and return to space in four months. Ultimately officials envision the shuttle being able to turn around in a matter of weeks. Each shuttle would have a life of 100 missions.

Apparently responding to the space program's critics, Christopher C. Kraft Jr., director of the Johnson Space Center in Houston, in a message relayed to the astronauts just before they left the shuttle, said "We just became infinitely smarter."

What uncertainty remaining today centered on questions about just how quickly the spaceship could be readied for another flight. Specialists still have to determine the extent of the damage to the tiles that protect the ship from the sear-

ing heat of re-entry into the atmosphere. There was also some question about the suitability for quick re-use of the launching pad at Cape Canaveral, which was significantly damaged at liftoff on Sunday [Page A23].

Donald K. Slayton, orbital flight test manager and a former astronaut, said that a preliminary inspection revealed no more tiles missing than had been seen earlier on television from space. He said,

The shuttle's success is sweet vindication of American know-how, but social scientists say the psychological uplift will pass. News analysis, page A22.

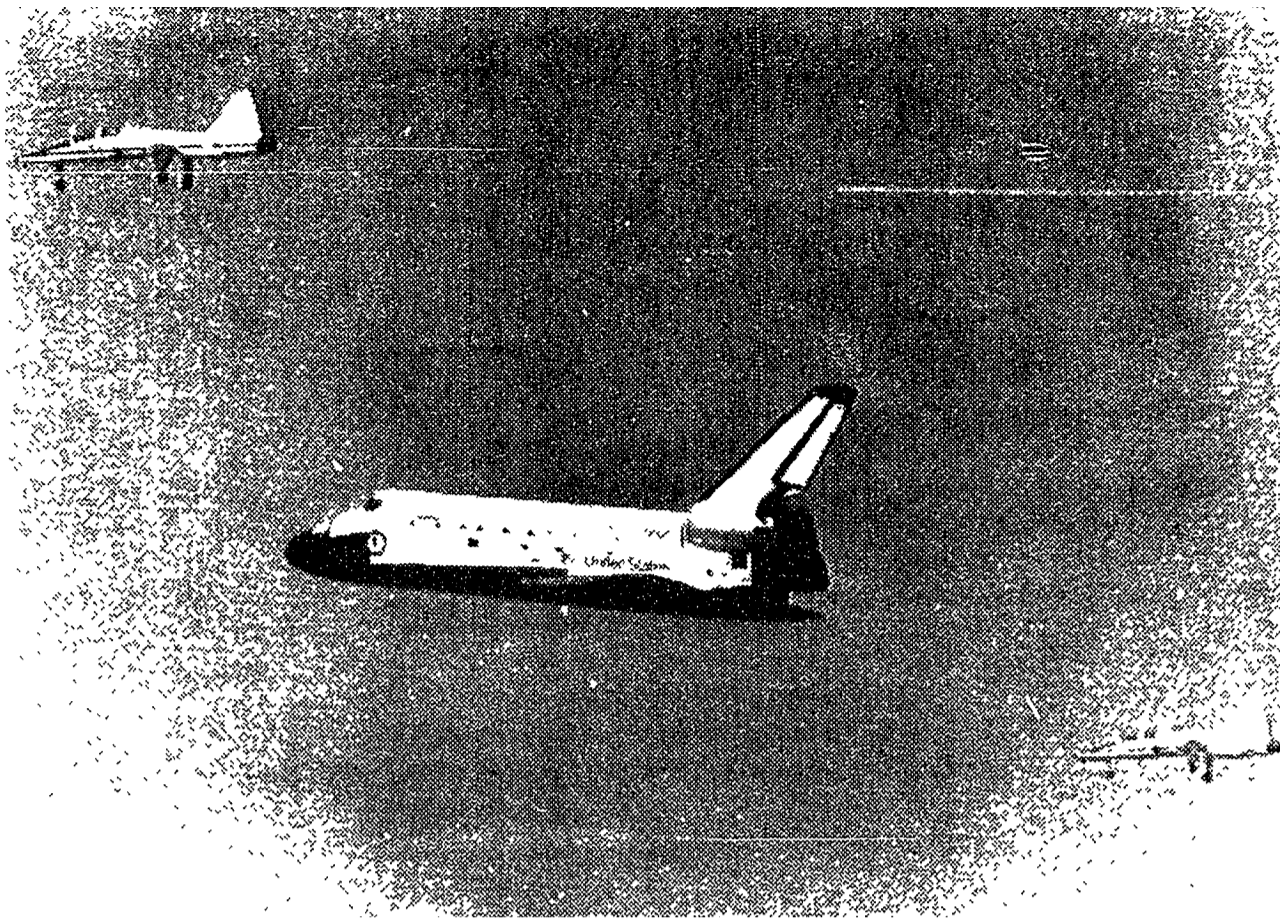
"minimum work" would be required to replace them. But he added that a more detailed inspection would follow.

If close inspection of the tiles here and later when the Columbia is airlifted back to Florida reveals no fundamental problems, the "optimistic" estimate of a launching in the fall would prove true, with the third test mission in the spring and the fourth and final one later in 1982. One of the last two test missions, both of which are to last for seven days, would orbit while opened to the sky, rather than flying upside down to scan the earth.

The first operational, or nonexperimental, flight would take place by the end of that year.

The payload for that flight, as now planned, will be a TDRS or Tracking and Data Relay Satellite to be gently released into earth orbit. Among other roles, this

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The Columbia, accompanied by two escort planes, descending toward a landing at Edwards Air Force Base



NBC News

The shuttle's rear wheels touch the runway on Rogers Dry Lake. Craft was traveling about 215 miles an hour.



CBS News via Associated Press

John W. Young, left, and Capt. Robert L. Crippen walking away from their craft after landing safely in the desert

2d Shuttle Trip in 6 Months Is Among Goals

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satellite would provide continuous communication between the shuttle and the command center at Houston, whereas now there are numerous blackouts. Then will come three missions carrying a variety of communications and other satellites.

They will be followed, on the fifth operational mission in mid-1983, by the first military satellite of undisclosed purpose and, later that year on the sixth mission, by the European-built Spacelab, the first major scientific payload, in which scientists will be able to work as in a laboratory on earth.

In its military uses, the shuttle will be able to carry satellites into orbit for reconnaissance; some have suggested that it might be used in the assembly of unmanned space stations armed with lasers and other sophisticated weapons.

Plans for nonmilitary satellites envision them assisting scientists in mapping and forecasting weather as well as offering data for agricultural use and collecting solar energy for the earth. The most futuristic proposals for the shuttle see it playing a role in the construction of space colonies.

An important test being performed here with a view to improving shuttle performance on future missions is weighing the spaceship and determining its center of gravity with great precision before anything is unloaded. In the planning of this mission elaborate computer simulations and wind tunnel tests were performed to achieve optimum response from the spaceship to the stresses of re-entry and to subsequent efforts of the astronauts to fly and land it like an airplane. A critical factor was knowing its weight distribution and center of gravity. Never before had a vehicle built like a stubby-winged airplane attempted to re-enter the atmosphere.

Recording devices aboard the shuttle

were designed to keep track of every adjustment of the rudder and other flight-control surfaces. Acceleration meters recorded the response of the craft to these attempts at flight control. These records, plus the information on weight and center of gravity, could be used to redesign future missions, if necessary, but it is not yet clear to what extent in-flight data will be available. The device for recording such data apparently failed in at least part of the mission.

Reservicing of the Columbia was delayed several hours when traces of freon and possibly hydrazine, one of the fuels, were detected near the shuttle. Mr. Slayton, the orbital flight test manager, said, "They were playing super safe." But there was no significant leakage.

The space agency hopes that when the shuttle reaches its operational phase each mission will cost from \$35 million to \$40 million in 1981 dollars, of which \$5 million would be charged to the users. Space agency officials said there was no way to separate the costs of this mission from the total costs of \$9.9 billion to develop the shuttle and launch the first four test missions. 9 billion.

For at least some engineers the chief worry in the Columbia's re-entry into the atmosphere was that the loss of tiles on pods housing fuel tanks for the two orbital maneuvering systems might lead to rupture of those tanks from the heat of re-entry. It is unlikely that the Columbia will be declared fit for another mission until the reason for the tile losses has been established and the possibility of such losses in even more critical parts of the shuttle is eliminated.

The servicing operations here involve an elaborate series of technological steps that began this afternoon when, almost as soon as the Columbia had come to a halt, a "flammability vapor detector" the size of a kitchen range was rolled up to the spaceship by men in protective suits to "sniff" for explosive vapors.

The concern was that such vapors,

particularly hydrogen gas, might have leaked into the cavernous cargo bay of the shuttle or into spaces surrounding its various engines in the rear of the craft, turning the shuttle into a potential bomb. While one van moved up to attach air hoses to blow any such gases out of the internal spaces another van attached similar lines to pump freon refrigerating fluid into the spaceship cooling system, especially the part that protects the extremely heat-sensitive computers.

Numerous other tasks remain before the Columbia is ready for its piggyback flight back to the Kennedy Space Center. They include purging fuel tanks for all three of its engine systems, testing the tiles, draining and purging the fuel cells that provided electricity and generated water as a byproduct and installing the 17-piece tail cone assembly.

The latter will protect and streamline the stern of the shuttle in its ride back to Florida. It will take an estimated 160 hours of work here before the Columbia is ready to be hoisted 60 feet up inside a special gantry so that the 747 can move under it and receive its load.

In the giant hangar at the Kennedy Center where two shuttles can be serviced side-by-side, the Columbia's tiles will be repaired and all preparations made for its next flight.

That most of the damaged tiles came off in pieces suggests that they were shattered in some way. In an interview yesterday Mel Burke, manager in charge of preparations here for the landing, pointed out that the original loss of tiles, when the Columbia was first carried on a test flight here atop a 747, were apparently caused by the whipping action of green tape that came loose. The tape had been applied to streamline the sharp edges where tiles were missing. The Columbia was flown to Florida before all of its tiles had been applied. Instead of protecting the tiles in flight, Mr. Burke said, the tape came loose and whipped at the fragile tiles, breaking a number of them.