



Emphasis on the 'Shuttle'

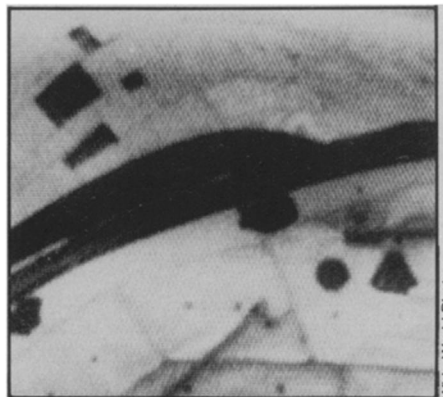
Poised upon the dawn, the leaving had all the stentorian drama of the Old Days: twin pillars of fire, a roiling tower of cloud and a bone-shaking roar. But it was the homecoming — smooth, silent and straightforward against the tumultuous excitement of a veritable city of onlookers — that told the tale. With no more visible furor than that of the 5:10 commuter train to Westport pulling into the station, the vehicle called the space shuttle became a shuttle indeed.

Past astronauts had made their journeys to space in capsules lofted by mighty, needle-like rockets, dispatched by a launch control center teeming with as many as 500 people, and retrieved by being ignominiously derricked out of the waters of some remote patch of ocean. John Young and Robert Crippen, however, aboard the winged spaceplane Columbia (barely half the height, even with boosters and fuel tank, of the Apollo/Saturn 5 "stacks" used for missions to the moon), were sent off on April 12 by fewer than a third as many launch personnel, and returned to earth 2 days 6 hours 20 minutes and 48 seconds later by simply coasting to a stop on a runway.

Rookie astronaut Crippen was excited enough about being in space — "John's been telling me about this for three years," he radioed from orbit, "but there ain't no way to describe it. Fantastic!" — but both crewmen seemed nearly ecstatic (as test pilots go) with the performance of their previously untried craft. Following the immaculate landing on California's Mojave Desert, in fact, the normally taciturn Young (a veteran of two Gemini and two Apollo missions, including 71 hours on the surface of the moon) clambered out of Columbia even before a flight doctor could reach him for a brief check, and seemed to be virtually beside himself with emotion. After two days of leaving quote-hungry reporters starved for verbal signs of his feelings, he darted around the craft on the

runway in quick bursts, waving his arms, snapping his fingers and flashing quick grins at the condition of various parts of the still-warm vehicle.

The flight's main goals were simple: (1) get up, and (2) get down. But there was far more to the initial checkout of the most complex space vehicle ever flown. Hours would pass when conversation between Columbia and ground personnel at NASA's Johnson Space Center in Houston consisted almost entirely of temperature readings, state vectors, switch-position verifications and other engineering matters. Instruments on the ground, in aircraft, in satellites and on Columbia itself monitored various environmental conditions that could affect the shuttle's environment (launch and landing weather, a solar flare, etc.), while other devices provided detailed data on the vehicle's response and performance. Columbia's cavernous payload bay, for instance, designed to transport everything from experimental material samples to interplanetary space probes, on the first mission carried only some special Developmental Flight Instrumentation capable of keeping track of up to 700 strain gauges and other sensors



TV image of Columbia's right rear portion reveals dark spots where thermal-protection tiles came off during the launch orbit.

in thousands of individual channels. An additional cluster of accelerometers and rate gyros recorded the orbiter's reaction to the aerodynamic loads of launch, reentry and landing. These data, together with input from other sensors destined for the shuttle's three or four remaining test flights, will help in assessing the behavior of the new-generation craft, although if Young and Crippen had any complaints, they seemed likely to be more matters of detail than of any major design miscalculations.

The flight was certainly not trouble-free, though neither was any manned space mission ever conducted before it. The launching would have taken place on April 10, had not an improbable, 40-millisecond timing difference between the orbiter's primary and backup computers stopped the countdown with only minutes to go. Correcting the problem caused a two-day delay because the brief pause to fix it so late in the countdown necessitated emptying and refilling the craft's huge external fuel tank with its volatile propellants of liquid hydrogen and liquid oxygen. A tape recorder storing the developmental flight data refused to turn on and off as it should, threatening to miss some of the important readings until engineers noted that the astronauts could stop the device at will with a circuit breaker. Various temperatures in the cabin and in individual components were at times too high or low, but most seemed correctable and apparently caused no serious consequences.

Some consternation arose when the astronauts were transmitting live television pictures of the payload bay, seen through the crew cabin's aft windows, and it was discovered that some of the thermal-insulation tiles covering the orbiter's maneuvering engines had come off during the launching. The tiles, essential to the orbiter's safety during the heat of ascent and reentry through the atmosphere, have been one of the shuttle's most troublesome design problems, but an analysis of various data (including pictures from earth-based spy cameras) indicated no tiles to be missing from the orbiter's underside (invisible to the astronauts). A preliminary check of the orbiter after the landing indicated that no additional tiles had come off during reentry.

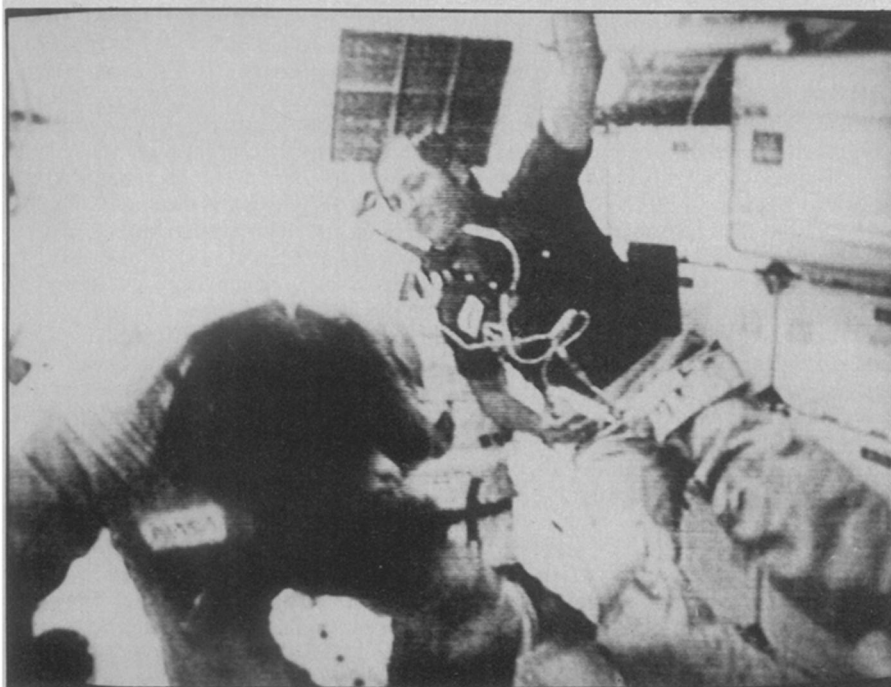
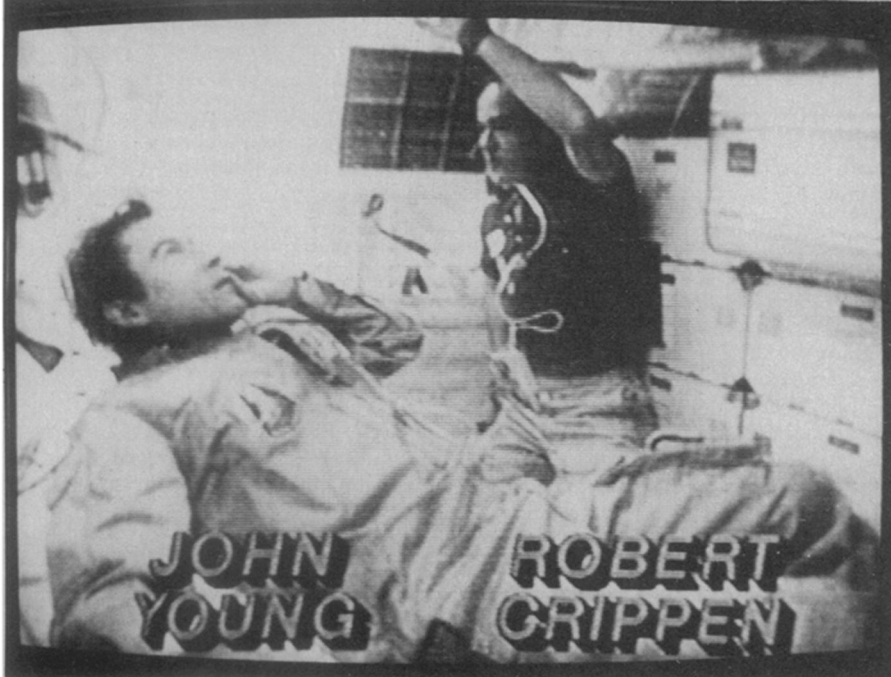
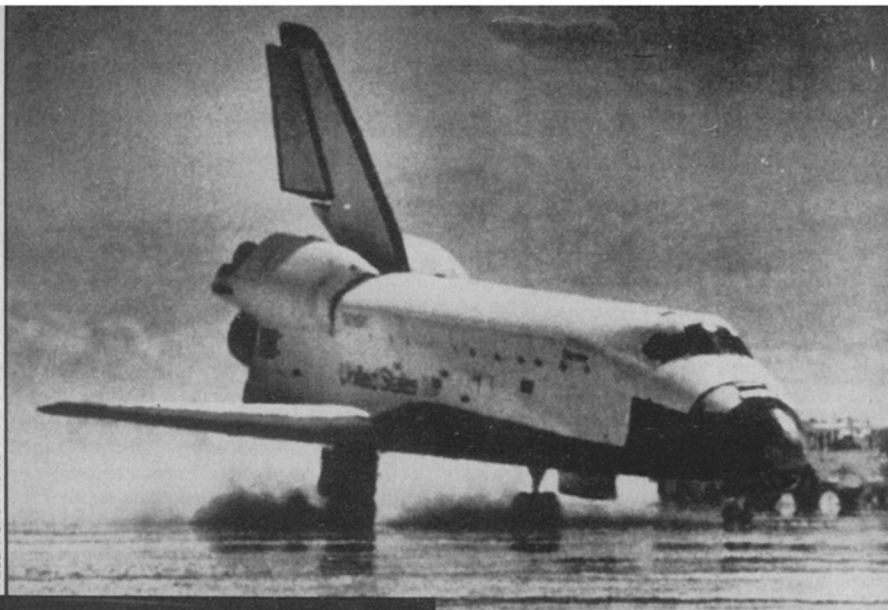
There were other minor "glitches," but neither the astronauts nor officials on the ground ever described the mission's progress as "okay, but..." Instead, there was a continuing litany of words and phrases such as "picture-perfect," "just amazing," and (from Crippen) "zoo-o-o-perb." The mission's most important events — apart from (1) and (2), above — were to confirm that the payload-bay doors could be readily opened (necessary for cooling as well as conducting shuttle business in orbit) and closed (for reentry), and the astronauts accomplished both deeds without the need for either "manual overrides" or more drastic measures such as spacewalk-

ing outside with a crowbar. Also important was confirming the performance of the inertial-measurement system that would keep the orbiter's computers aware of the craft's orientation in space—essential for a vehicle designed to operate with minimum assistance from the ground. Again, mission accomplished.

Another sort of comment on the mission was felt by some observers to be in the

Columbia (right) touches down at Edwards AFB in California. TV pictures from orbit reveal the orbiter's spacious cabin as astronauts John Young and Robert Crippen (below) talk by radio with Vice President George Bush—during which conversation Crippen executes a typical zero-gravity somersault (bottom).

Wide World Photos



nature of the crowds that thronged to watch its beginning and end. The press corps gathered for the launching at NASA's Kennedy Space Center in Florida, besides being swelled to an official count of about 2,700 (and a far larger unofficial one), was heavily laced with members from the growing number of enthusiastic "pro-space" publications and organizations that have proliferated around the country in the past two years. Each minute of the final countdown was met with a round of applause, as were NASA officials who appeared afterward to comment on the lift-off. Applause has been heard at launchings ever since there have been launchpads, although the reportorial ebullience at the shuttle launching prompted some old-hand journalists to comment that the press should be less directly involved with events it is covering.

Meanwhile, Columbia will fly again. Following a few days of preliminary checkout at NASA Dryden, the orbiter was to be flown atop its 747 carrier plane to KSC, where it will be refurbished and repaired where needed for its second mission, possibly to take place in October. That flight will also see Columbia carrying its first "real" payload, a package of remote-sensing instruments that will include synthetic-aperture radar, a multispectral radiometer, an optical lightning detector, an ocean-chlorophyll sensor and other devices for studies of the earth. The crew for that mission, NASA said this week, will be astronauts Richard H. Truly and Joe H. Engle, who participated in airdrop tests of the shuttle's handling characteristics and served as backup crewmen for Young and Crippen.

In years to come, if the shuttle meets its goal of routinely conducting dozens of flights per year, its operations should change radically. The number of launch personnel, already down by two-thirds from Apollo days, may drop by the same percentage again, while refurbishment and landing-support teams may shrink proportionately. The question is: What will those missions be carrying? □