

Space shuttle: On its own and s-m-o-o-t-h

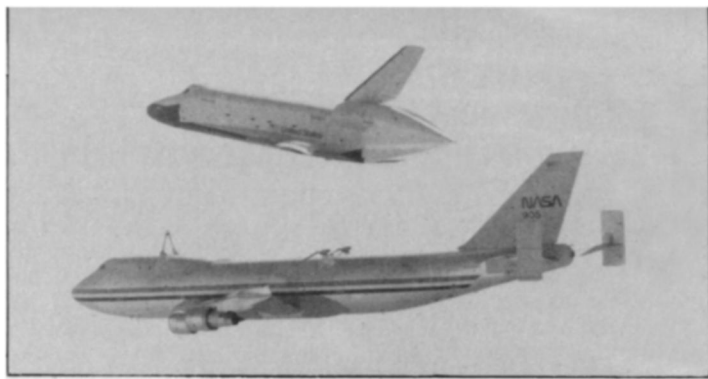
"My last flight was Apollo 13," said astronaut Fred W. Haise Jr. "It left me with the feeling that something didn't go right that we couldn't really recover from." A burst oxygen tank kept the Apollo 13 lunar module, of which Haise was the pilot, from attempting to land on the surface of the moon, and it took careful effort by astronauts and ground controllers to ensure the safe return to earth. Last Friday he had no such problems.

On Aug. 12, with Haise commanding and fellow astronaut Charles G. Fullerton at his side, the space shuttle flew on its own for the first time, unfettered to the 747 jet that had carried it aloft in this as well as its eight previous flight tests. Beginning with a slight lurch as explosive bolts separated the two vehicles, the shuttle's maiden "free flight" lasted only 5 minutes 23 seconds, but it was so smooth all the way that the only deviations from the predicted flight path were caused by the astronauts playing it safer than they had to. "The wind tunnel data," said Haise afterward, "was better than my conservative prognostications."

The 747 began its taxi roll at 8 a.m., PDT, right on schedule, with the shuttle fastened overhead like a DC-9 bolted to the roof. About 48 minutes later, nearly five miles above California's Mojave Desert, 747 commander Fitzhugh L. Fulton Jr. gave the clearance—"launch ready"—and Haise pushed the bolt-firing button for separation. Immediately lifting the shuttle's nose to pull it out of the way of the 747's vertical tail, he rolled the craft to the right while the big jet rolled left, thus putting some safe horizontal distance between them as well. A swarm of T-38 "chase planes," gnatlike beside the huge vehicles maneuvering among them, recorded the process and called out the growing separation distances, since the 747 was completely out of view of the astronauts.

Following a course laid out in the shape of a flat-throated letter "U," the shuttle first accelerated to give the crew an idea of its handling qualities at landing approach speed, then made a pair of 90° turns to line up with the runway at Edwards Air Force Base. Tens of thousands of spectators, including hundreds of reporters, stared into the brilliant desert sky as the 75-ton craft began its descent, nosing up and steepening its path to eat up speed for the final touchdown. The main landing gear touched the ground at an estimated 183 knots, kicking up a dust trail so smooth that it seemed to indicate that the main gear had not even bounced. The nose gear touched down 14 seconds later, the dust indicating perhaps a single small bump.

Haise and Fullerton agreed that the craft handled more like a fighter plane than like the giant vehicle it is, in large measure due to its good roll control. As



On its own at last, the space shuttle pitches

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many as seven more free flights had been scheduled before the first one took place, but National Aeronautics and Space Administration officials were considering reducing the number if all of the test objectives could be met. The first series of flights, in which the shuttle was carried unmanned atop the 747, was trimmed from six to five, and the number of manned-but-captive flights was reduced from five to three.

It would probably be possible to go ahead with the goal of a first orbital mission in 1979, even with only one free flight, says flight-test manager Donald K. Slayton—"say, if the lake bed became flooded and stayed flooded for the next two years"—but that would be a tense future. Future tests are slated to try out the shuttle over a wider range of air-speeds, as well as to test its automatic guidance and landing equipment. It is also considered important to fly the craft at least once without the turbulence-reducing "tailcone" that covers the region where the shuttle's main engines will be during an actual descent from orbit. The tailcone is used to reduce buffeting on the 747's tail surfaces.

The next free flights had been scheduled for Aug. 30 (with astronauts Joe H. Engle and Richard H. Truly aboard, alternating on successive missions with Haise and Fullerton), Sept. 16 and Oct. 13, although the dates may change with the success of the maiden trip.

The craft used in all the tests, christened *Enterprise* by former President Gerald Ford, will not be the first to get into orbit—that honor is reserved for the next one to come off the assembly line on August 1978—but it will get there. In January 1979, a few months before the first orbital flight by the present schedule, *Enterprise* will go into the shop at prime shuttle contractor Rockwell International to be converted from a testbed to an orbit-worthy vehicle. Thicker surface insulation will be added, along with reinforced leading wing edges, a reaction-control system, orbital maneuvering systems, communications equipment and assorted plumbing. This should take about 18 months, and what with checkouts and other operations, *Enterprise* may not see space until July 1981, probably making it at least the eighth shuttle launch.

The first shuttlecraft may reach orbit as early as March 1979, but that much-cited date has not included possible delays from such sources as difficulties with installing the tilelike ablative insula-

tion, or uncertainty about the high turbine pressures in the shuttle's main engine, which remains to be fully tested. If such delays interfere, the first orbital mission could come much later in 1979, with corresponding slippage in subsequent missions.

Meanwhile, however, other shuttle activities are taking place around the country. One of the rocket engines for the vehicle's two strap-on boosters was fired last month in Utah. Planners in Washington are rapidly working out details of how to charge the shuttle's many planned users for the launch service. And a second group of shuttle astronaut candidates is being interviewed in Houston this week at NASA's Johnson Space Center. A total of about 200 of the 8,079 applicants will get as far as the interview stage, of whom perhaps 20 will make the final cut, to be announced in December. □

'Shocking' obedience found in children

More than a decade ago, psychologist Stanley Milgram set out to probe the human "obedience to orders" that enabled Germans to carry out mass human exterminations during World War II, and at the same time allowed many of their Jewish victims to march passively to slaughter. Using controversial simulated shock experiments, Milgram showed that an alarming proportion of adults (65 percent of those tested) were willing to inflict severe, possibly permanent, damage upon persons they did not know—simply because they were instructed to do so.

Similar results have since been obtained, primarily in studies in Germany and Australia. But until now, no such tests had been performed on children, or in non-"European-derived" cultures. However, newly reported obedience studies among 192 youngsters in Amman, Jordan, indicate that overobedience may be a universal phenomenon that cuts across ages and cultures.

Duplicating Milgram's original model, University of Jordan researchers Khawla A. Yahya and Mitri E. Shanab tested 6 to 16-year-old Jordanian school children. The youngsters, 96 males and 96 females, were divided into groups of "teachers" and "learners." Teachers were trained and instructed to administer progressively higher doses of electricity each time their learner gave the wrong