

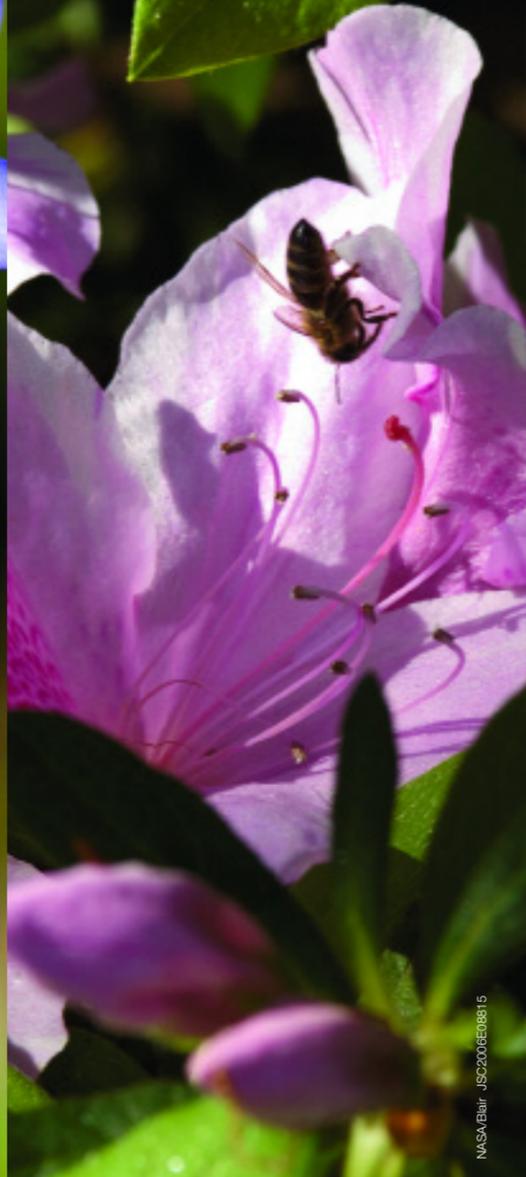
Spring has sprung at JSC



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Incredible flying machine

Launching the first shuttle

by Christopher Kraft

The launch of STS-1 was unquestionably a tense and exciting experience. During the last few months before the launch, all levels of the management team, both government and contractor, were subjected to intense reviews by both NASA management and several outside review committees.

These committees were made up of some of the nation's foremost experts. The space shuttle main engine, the orbiter automatic control and thermal protection systems received vigorous and extremely thorough examinations. Other critical systems such as the auxiliary power unit, fuel cells, environmental control systems and the payload bay door operation came under similar attention.

Although there were some dissenters, almost everyone involved agreed to proceed with the first flight. One dissenter made the dire prediction that the tiles on the underside of the orbiter would fall off after the maximum heating period. This despite the fact that all of the tests that had been suggested regarding this concern had been successfully accomplished.

As the time of launch approached, the best word to describe the NASA team is that we were anticipatory. The final Flight Readiness Review gave the "GO" for launch and the countdown started. I recall being asked at the time how we made such a complex and awesome decision, to which I responded: "We have examined every aspect of the Space Transportation System and found there is nothing left to do and so it is time to fly." Frankly, my biggest concern was the paucity of reliable aerodynamic data in the Mach number range of 8 to 2. We had done an exhaustive study using a very wide range of each aerodynamic parameter and employing a Monte-Carlo process, but the fact that the machine was basically unstable in this flight regime did give me pause.

After the first launch attempt was scrubbed, the STS-1 launch went off well. To say it was thrilling would be a gross understatement. The powered flight phase has always made me apprehensive, but this one was almost overwhelming. The fire and steam and the high acceleration were impressive.

The entire flight went off with almost perfect precision. There were a few anomalies, but John Young's comment that "it is a beautiful flying machine" certainly described everyone's emotions. The entry and landing were particularly gratifying because of the tremendous effort that had been required to reach that point in the program. Again I was asked for a comment. I said "we had just become infinitely smarter." I would not say it any differently today.

The first launch of the Crew Exploration Vehicle will be equally trying. The engineers working on this challenging program will have similar emotions, but they too will find tremendous satisfaction from having accomplished the task. It will require the Herculean support of every person involved to reach the moon again in the next decade. However, I am confident that the management team and the young talent now being assembled will do it well.



Launch view of the Space Shuttle Columbia for the STS-1 mission, April 12, 1981.

NASA S81-30492



Celebrating 25 years

The following was compiled from stories that ran in the Space Center Roundup on April 14, 1981 and April 12, 1991.

Space shuttle hailed as 'incredible flying machine'

Spaceship *Columbia* roared into orbit April 12, 1981 from Florida's Kennedy Space Center.

Maneuvering through space and circling Earth 36 times, astronauts John Young and Robert Crippen tested its systems then landed like an airplane on schedule: two days, six hours, 20 minutes and 52 seconds later.

The world hailed *Columbia* as the first true spaceship—an incredible flying machine. It heralded the beginning of the era of crewed round-trip travel from Earth.

The launch preceded with a message nine minutes before liftoff from President Ronald Reagan. It was read by George Page, shuttle launch director:

"You go forward this morning in a daring enterprise, and you take the hopes and prayers of all Americans with you," said the president's message.

"As you hurtle from Earth in a craft unlike any other ever constructed, you will do so in a feat of American technology and American will."

Rising on a throne of 6.6 million pounds of thrust, *Columbia* at first flew steeper than programmed, its three main hydrogen-powered engines and two solid rocket motors driving skyward.

Columbia made a 100-degree roll to the right, heading for its imaginary target. Two

minutes and 12 seconds later, the solid rocket boosters were jettisoned, to be recovered later 151 miles downrange.

Eight minutes and 34 seconds later, the main engines cut off. The speed was 25,670 feet per second. The external tank was jettisoned and broke up over the Indian Ocean, debris landing as programmed 21,000 miles downrange from Kennedy Space Center.

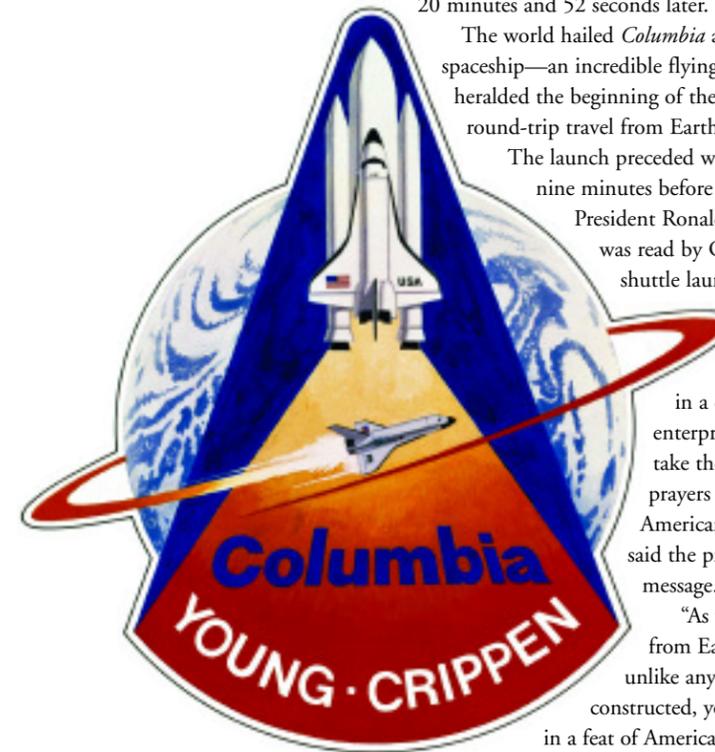
Columbia's orbital maneuvering system (OMS) took over at 10 minutes, firing for one minute and 27 seconds, to establish an orbit of 132-by-57 nautical miles. A second OMS burn achieved a 130-mile circular orbit. A third OMS burn at six hours, 20 minutes set the orbit at 148-by-131.7 nautical miles and a fourth added 30 feet per second to set the circular orbit at 149.3-by-147.6 nautical miles.

The morning of Day 3 arrived and astronauts Young and Crippen readied for the crucial test of a winged Earth entry and wheels-down landing. Previous spacecraft returned to Earth with parachutes and splashdown.

A quarter of a million people were on the (California) lakebed that morning, which was awash in a sea of Winnebagos, blue bunting, U.S. flags and network anchors, but most of the half-million eyes were trained on the sky.

Although they couldn't see the spacecraft just yet—*Columbia* was still far out over the Pacific—they had been able to hear the exchanges between Mission Control and the two astronauts thanks to loudspeakers out on the desert floor. "Okay, understand. Go for the deorbit burn," Commander John Young had said when the time came to fall out of orbit. "Thank you now."

Earth entry lasted about 31 minutes, as the spacecraft *Columbia* entered the atmosphere



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400,000 feet above Earth. At this point, *Columbia* was about 4,390 miles from the Edwards landing strip in California.

At 151,000 feet, traveling more than eight times the speed of sound, Crippen saw coastline ahead. "What a way to come to California!" he called. The worst of the waiting was over. Theory was becoming a reality.

Twin sonic booms announced the arrival of *Columbia* while the vehicle was still at an altitude of 54,000 feet. About 400 feet above the desert, landing gears were lowered.

Columbia landed on Runway 23 of Rogers Dry Lake at Edwards Air Force Base in the Mojave Desert, rolling 8,993 feet—within 200 feet of the estimate.

Shuttle program officials and astronauts said *Columbia* exceeded performance expectations and dubbed it their "incredible flying machine."



Astronauts John W. Young (left), commander, and Robert L. Crippen, pilot, crewed Space Shuttle Columbia on its maiden voyage—the first orbital test flight of the Space Transportation System.

Shuttle program 'firsts'



STS-3

The Space Shuttle Columbia touches down on the Northrup Strip at White Sands Missile Range, New Mexico, marking the first (and only) time it touched New Mexico soil. Landing was shortly after 9 a.m. Mountain Standard Time on March 30, 1982.

STS-7

Early shuttle program firsts continued with the flight of STS-7 in June 1983. Sally K. Ride became the first American woman to go into space aboard Challenger on its second flight. Between her first and second missions (STS-41G), Ride became the first female "CAPCOM" in Mission Control to relay information to the STS-2 and STS-3 crews on orbit.



STS-8

Astronaut Guion (Guy) S. Bluford became the first African-American in space aboard Challenger on the first mission to launch and land at night August/September 1983. Bluford flew three more shuttle flights before leaving NASA in 1993.

STS-41B

The first mission to end with landing at the Kennedy Space Center included another historic first when Astronaut Bruce McCandless II flew untethered outside Challenger during a demonstration spacewalk. The nitrogen-propelled, hand-controlled manned maneuvering unit was used operationally on the next mission to retrieve and repair the ailing Solar Maximum Mission spacecraft.



STS-63

Astronaut Eileen M. Collins became the first woman pilot of the space shuttle on the first mission to rendezvous with the Russian space station Mir in 1995. She later flew three more times, most recently as commander of STS-114 last July. Collins became the first woman to receive the National Space Trophy on March 24, 2006. The trophy was established by the Rotary National Award for Space Achievement Foundation, and is presented annually in Houston to an American for career achievements in space exploration.



STS-71

This view of the Space Shuttle Atlantis still connected to Russia's Mir space station was photographed by the Mir-19 crew on July 4, 1995. The STS-71 mission was the first time that the shuttle docked with the Mir space station.



STS-88

A variety of white and gray clouds form the backdrop for this 35mm scene of the connected Zarya and Unity modules floating in space after having been released from Endeavour's cargo bay a bit earlier. Six crewmembers, who had earlier spent the majority of their on-duty mission time working on the tandem of space hardware, watched from Endeavour as the joined modules moved away from the shuttle.

Space Shuttle Facts

- Propellant weight at liftoff: 3,851,887 lbs.
- Air pressure = 14.7 pounds per square inch (psi), same air pressure as sea level on Earth. (The space station is about 14 psi (equal to the average atmospheric pressure in Oklahoma City, altitude 1,285 ft; normal air pressure in Las Vegas = 13.6 psi, and in Denver it's 12.1 psi).
- Windows (six across the front, two looking into the payload bay, two overhead and one hatch) each are actually three panes, not just one. So how thick are they (discounting the hatch)? Outer: 0.6 inch; middle: 1.3 inches; inner: 0.5 inch
- Missions (all 114) have begun from the Kennedy Space Center in Florida. Twenty-eight of those were launched at night.
- At full power, the shuttle main engines generate, in watts, the equivalent output of 13 Hoover Dams.
- During the first two shuttle missions, the external tank was painted white. Beginning with STS-3, NASA decided not to paint the tank, saving 1,100 pounds on each flight.
- The flow of fuel from the shuttle external tank into the main engines is equal to draining an average swimming pool in 25 seconds. The pump pressure equals that of a submarine three miles deep.
- The shuttle's solid rocket boosters have a combined thrust of 5.3 million pounds, which is equal to 44 million horsepower, or 14,700 six-axle diesel locomotives, or 400,000 subcompact cars.
- The SRBs are two feet shorter than the Statue of Liberty (they're 149 feet, 1.6 inches tall), but each, at 700 tons, weighs three times as much.

Where the wild things are

by Brad Thomas



NASA/Blair JSC2003E56650

Cutting-edge technology and sophisticated rocket ships are often associated with NASA's Johnson Space Center. But once inside the gates, it can become very apparent that engineers, astronauts and support personnel are not the only ones on site. They share the 1,580-acre facility with an abundance of creatures.

JSC is the home of a wide range of wildlife and domesticated animals. The wildlife includes, but is not limited to, deer, possums, squirrels, skunks, snakes, koi and a large assortment of feathered friends. There has even been a documented sighting of a bobcat on site. Also, JSC hosts domesticated livestock and is involved in an effort to breed an endangered species, the Attwater's Prairie Chicken.

Stephanie Walker, a flight crew systems manager, said that she enjoys the outdoor surroundings at JSC, in particular the ducks. "I think it is a great stress release to watch the ducks," she said. "Pure concrete does not relax me."

Walker is also co-chairperson of the Wildlife Committee, which was chartered by the JSC Safety Action Team (JSAT). One purpose of the group is to educate JSC employees on how to coexist safely with JSC wildlife and provide information on seasonal wildlife issues.

Deer are the largest wild animals on site and are one of the animals most likely to be involved in an incident, in particular collisions with automobiles.

Wildlife Committee Co-chairperson Andy Ideler said that Texas A&M University estimates that there are between 160 to 174 deer on site. Ideler is responsible for the group's deer committee.

JSAT started the deer committee to address the increasing deer population at the center. Ideler said that different options were discussed including capture/relocate and birth control before JSC opted for birth control.

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