



## Space Shuttle Era Facts

NASA's shuttle fleet achieved numerous firsts and opened up space to more people than ever before during the Space Shuttle Program's 30 years of missions.

The space shuttle, officially called the Space Transportation System (STS), began its flight career with Columbia roaring off Launch Pad 39A at NASA's Kennedy Space Center in Florida on April 12, 1981. Atlantis flew the final space mission, STS-135, in July 2011.

That first mission verified the combined performance of the orbiter vehicle (OV), its twin solid rocket boosters (SRBs), giant external fuel tank (ET) and three space shuttle main engines (SSMEs). It also put to the test the teams that manufactured, processed, launched and managed the unique vehicle system, which consists of about 2 1/2 million moving parts.

The orbiter, most commonly referred to as the space shuttle, is the only part of the shuttle "stack" that makes the trek into orbit. Its boosters are jettisoned into the Atlantic Ocean, retrieved and reused. The external tank is the only part of the stack not used again. Instead, it re-enters the atmosphere about nine minutes after launch and burns up over the Pacific Ocean. When the shuttle returns to Earth, it does not land under parachutes as NASA's Apollo capsules that preceded it. Instead, it returns by gliding back on a pair of wings to a runway on Earth.

As the world's first reusable spacecraft to carry humans into orbit, the shuttle possesses a 60-foot-long payload bay and robotic arm that can carry several satellites into low Earth orbit on one flight, service them and even bring them back for future use. The shuttle fleet, which was designed to reach orbits ranging from about 115 to 400 miles high, also routinely carried whole laboratories into orbit for unique experiments. It also was called on to build the International Space Station (ISS), the largest spacecraft ever, which was assembled in orbit.

### Shuttle costs

For Fiscal Year 2010, the average cost to prepare and launch a shuttle mission was approximately \$775 million. Shuttle Endeavour, the orbiter built to replace shuttle Challenger, cost approximately \$1.7 billion to build. The life of the shuttle program has cost \$113.7 billion. (Not adjusted for inflation)

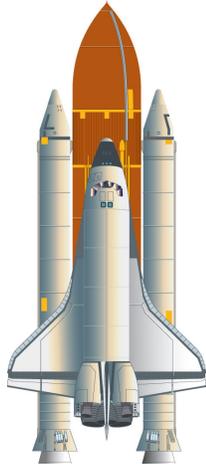
### Shuttle History

Each space shuttle is named after influential ships of science and exploration. All were built in Palmdale, Calif., by Rockwell International.

**Enterprise** was the first space shuttle, although it never flew in space. It was used to test critical phases of landing and other aspects of shuttle preparations. Enterprise was mounted on top of a modified 747 airliner for the Approach and Landing Tests in 1977. It was released over the vast dry lakebed at Edwards Air Force Base in California to prove it could glide and land safely.

**Columbia, OV-102**, was named after a sloop captained by Robert Gray, who on May 11, 1792, maneuvered his ship through dangerous inland waters to explore British Columbia and what are now the states of Washington and Oregon. Columbia was the first shuttle to fly into orbit on STS-1. Its first four missions were test flights to show that the shuttle design was sound. Astronauts operated the robotic arm and put all the flight systems through evaluation phases during the test flights. Columbia deployed numerous satellites and operated several times as a laboratory in space during its missions and was the only shuttle to land at White Sands Space Harbor, in Las Cruces, N.M. Columbia and its seven astronauts were lost Feb. 1, 2003, when it broke apart during re-entry on its 28th mission, STS-107.

**Challenger, OV-099**, was named after the British Naval research vessel HMS Challenger that sailed the Atlantic and Pacific oceans during the 1870s. Challenger was the second operational shuttle and made its first flight, STS-6, on April 4, 1983. Challenger hosted missions that saw astronauts take the first-ever spacewalks with jetpacks, including the first mission to pull a satellite out of orbit, fix it and return it to service. Challenger and its seven astronauts were lost Jan. 28, 1986, when a seal on one of its boosters failed and hot gas burned through the external tank, igniting the propellants and causing the shuttle to break up in the resulting explosion. That flight, STS-51L, was Challenger's 10th mission.



# NASAfacts

### BY THE NUMBERS

<b>Length:</b> Space shuttle: 184 feet Orbiter: 122 feet	<b>Payload bay:</b> Length - 60 feet; Diameter - 15 feet
<b>Height:</b> Orbiter on runway, 57 feet	<b>Thrust, solid rocket booster:</b> 2.9 million pounds
<b>Wingspan:</b> 78 feet	<b>Orbit:</b> About 115 to 400 miles
<b>Gross liftoff weight* (system stack)</b> 4.5 million pounds	* weight will vary depending on pay- loads and onboard consumables
<b>Velocity:</b> About 17,500 mph	

	Earth Orbits	Miles Traveled	Total Crew	Time In Space
<b>Columbia</b> (28 flights, including STS-107)	4,808	121,696,993	total fliers: 160	300 days, 17:40:22
<b>Challenger</b> (10 flights, including STS-51L)	995	23,661,290	total fliers: 60	62 days 07:56:22
<b>Discovery</b> (39 flights, through STS-133)	5,830	148,221,675	total fliers: 252	365 days
<b>Endeavour</b> (25 flights, through STS-134)	4,671	122,883,151	total fliers: 173	299 days
<b>Atlantis</b> (33 flights, through STS-135)	4,848	125,935,769	total fliers: 207	307 days
	<b>= 21,152</b>	<b>= 542,398,878</b>	<b>= 852</b>	<b>= 1,334 days, 1 hour, 36 minutes, 44 seconds</b>

**Discovery, OV-103**, was named after one of the two ships used by the British explorer Captain James Cook when he discovered Hawaii and explored Alaska and northwestern Canada in the 1770s. Discovery was the third operational shuttle and made its first flight, STS-41D, in August 1984. Discovery has flown more than any other shuttle with 39 missions under its belt. Discovery's noteworthy career also includes both Return to Flight missions after the Challenger and Columbia accidents. Discovery deployed NASA's Hubble Space Telescope, which has altered the way we see and think of our universe. Discovery was the first space shuttle retired from NASA's fleet, following its STS-133 mission to the ISS in February/March 2011. Discovery will be moved to the Smithsonian's Udvar-Hazy Center for permanent public display.

**Endeavour, OV-105**, was named by students in elementary and secondary schools across the nation after a ship chartered to traverse the South Pacific in 1768. Endeavour was the last space shuttle built and was ordered to replace Challenger. The shuttle made an immediate imprint on space history in May 1992 during its first mission, STS-49. Three spacewalking astronauts made the unprecedented effort to grab an orbiting satellite with their gloved hands and pull it into Endeavour's cargo bay so it could be repaired and re-launched from the shuttle. Endeavour also accomplished the first repair mission to NASA's Hubble Space Telescope, basically giving the telescope contact lenses so it could peer to the farthest edges of the universe. Endeavour was the second shuttle to retire after its successful 25th mission, STS-134, which delivered the Alpha Magnetic Spectrometer-2 (AMS) to the ISS in May/June 2011. Endeavour will be moved to the California Science Center in Los Angeles, for permanent public display.

**Atlantis, OV-104**, was named after the primary research vessel for the Woods Hole Oceanographic Institute in Massachusetts from 1930 to 1966. Atlantis was the fourth operational shuttle and made its first flight, STS-51J, on Oct. 3, 1985. The shuttle sent probes to Venus and Jupiter and carried NASA's Destiny laboratory to the International Space Station. Atlantis also served as the final shuttle servicing mission, STS-125, for NASA's Hubble Space Telescope. STS-135 marked the 33rd mission and final flight for Atlantis and the Space Shuttle Program. Atlantis will be moved to the Kennedy Space Center Visitor Complex for permanent public display.

### Shuttle Astronauts

The first and second person to fly on the shuttle were John Young and Bob Crippen.

355 individual fliers have flown on NASA's space shuttles.

There have been 852 total shuttle fliers.

People representing 16 different countries have flown on shuttle flights.

306 men and 49 women have flown aboard shuttles.

Story Musgrave is the only astronaut to have flown on all five shuttles.

National Aeronautics and Space Administration

**John F. Kennedy Space Center**  
Kennedy Space Center, FL 32899

[www.nasa.gov](http://www.nasa.gov)

FS-2012-04-069-KSC

Sally Ride became the first American woman in space when she flew aboard Challenger on STS-7, in 1983.

Astronauts Jerry Ross and Franklin Chang-Diaz have flown the most shuttle missions with seven each.

The youngest person to travel in space was Sultan bin Salman bin Abdul-Aziz Al Saud (28 years, 11 months, 21 days), who flew on shuttle Discovery in 1985, on STS-51G.

The oldest person to travel in space is John Glenn, 77, who flew on shuttle Discovery's STS-95 mission in 1998.

Mike Fincke was the final first-time flier on the shuttle.

### Shuttle Miles Flown

NASA's space shuttles have traveled 542,398,878, making 21,152 Earth orbits.

### Space Shuttles by the Numbers

- 1** – Shuttle landing at White Sands Space Harbor
- 2** – Smallest crew size, on missions STS-1 through STS-4
- 2 days, 6 hours, 13 minutes, and 12 seconds** – length of Columbia's STS-2 flight, the shortest mission
- 5** – Shortened missions (Landed on an earlier date than originally scheduled)
- 6** – Night landings at Edwards Air Force Base
- 7** – Payloads retrieved, repaired, then re-deployed, which are not accounted for in the deployed/returned numbers below
- 8** – Largest crew size, on STS-61A and on STS-71's return from Russian space station Mir
- 9** – Shuttle dockings with Mir
- 17 days, 15 hours, 53 minutes, and 18 seconds** – Length of Columbia's STS-80 flight, the longest mission
- 20** – Night landings at Kennedy Space Center
- 25 tons** – Weight of the heaviest payload carried, NASA's Chandra X-Ray Observatory with its upper-stage booster, on STS-93
- 26** – Diverted landings (Landing that was scheduled to land in one location but due to unacceptable conditions lands at an alternate location)
- 34** – Night launches
- 37** – Extended missions (Landed on a later date than originally scheduled)
- 37** – Shuttle-ISS Dockings
- 53** – Launches from Kennedy's Launch Pad 39B
- 54** – Shuttle landings at Edwards Air Force Base
- 55** – 747 Shuttle Carrier Aircraft ferry flights to Kennedy's Shuttle Landing Facility (SLF)
- 78** – Shuttle landings at the SLF
- 82** – Launches from Kennedy's Launch Pad 39A
- 101** – Day launches