Kind of spacecraft

1. Manned spacecraft

As of 2016, only three nations have flown manned spacecraft: USSR/Russia, USA, and China. The first manned spacecraft was Vostok 1, which carried Soviet cosmonaut Yuri Gagarin into space in 1961, and completed a full Earth orbit. There were five other manned missions which used a Vostok spacecraft. The second manned spacecraft was named Freedom 7, and it performed a sub-orbital spaceflight in 1961 carrying American astronaut Alan Shepard to an altitude of just over 187 kilometers (116 mi). There were five other manned missions using Mercury spacecraft.

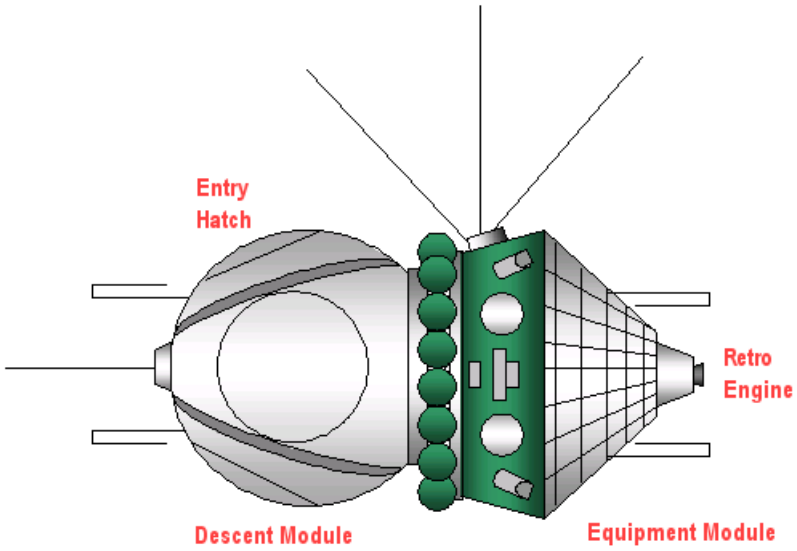
Other Soviet manned spacecraft include the Voskhod, Soyuz, flown unmanned as Zond/L1, L3, TKS, and the Salyut and Mir manned space stations. Other American manned spacecraft include the Gemini spacecraft, Apollo spacecraft, the Skylab space station, and the Space Shuttle with undetached European Spacelab and private US Spacehab space stations-modules. China developed, but did not fly Shuguang, and is currently using Shenzhou (its first manned mission was in 2003).

Except for the space shuttle, all of the recoverable manned orbital spacecraft were space capsules.

A space capsule is an often manned spacecraft which has a simple shape for the main section, without any wings or other features to create lift during atmospheric reentry. Capsules have been used in most of the manned space programs to date, including the world's first manned spacecraft Vostok and Mercury, as well as in later Soviet Voskhod, Soyuz, Zond/L1, L3, TKS, US Gemini, Apollo Command Module, Chinese Shenzhou and US, Russian and Indian manned spacecraft currently being developed. A capsule is the specified form for the Orion Multi-Purpose Crew Vehicle.

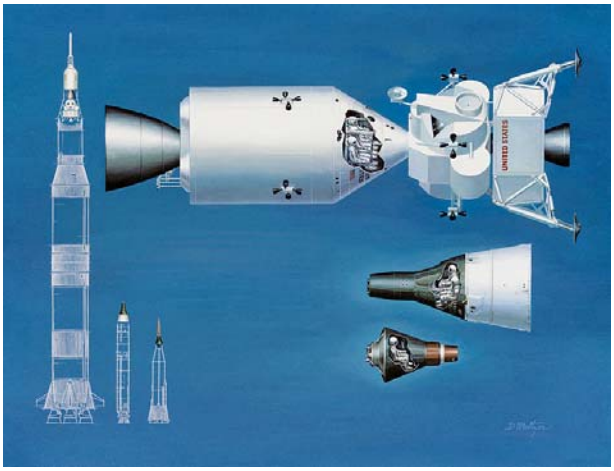
A manned space capsule must have everything necessary for everyday life, including air, water and food. The space capsule must also protect astronauts from the cold and radiation of space. A capsule must be well insulated and have a system that controls the inside temperature and environment. It also must have a way that

the astronauts would not be knocked around during launch or reentry. Additionally, since the inside will be weightless, there must be a way for the astronauts to stay in their seats during the flight. For this each seat has a system of straps and buckles. One of the most important things that a space capsule must have is a way to communicate with people back on Earth, or mission control.



Vostok Spacecraft

American Mercury, Gemini, and Apollo spacecraft



2. Spaceplanes

Some reusable vehicles have been designed only for manned spaceflight, and these are often called spaceplanes. The first example of such was the North American X-15 spaceplane, which conducted two manned flights which reached an altitude of over 100 km in the 1960s. The first reusable spacecraft, the X-15, was air-launched on a suborbital trajectory on July 19, 1963.

The first partially reusable orbital spacecraft, a winged non-capsule, the Space Shuttle, was launched by the USA on the 20th anniversary of Yuri Gagarin's flight, on April 12, 1981. During the Shuttle era, six orbiters were built, all of which have flown in the atmosphere and five of which have flown in space.

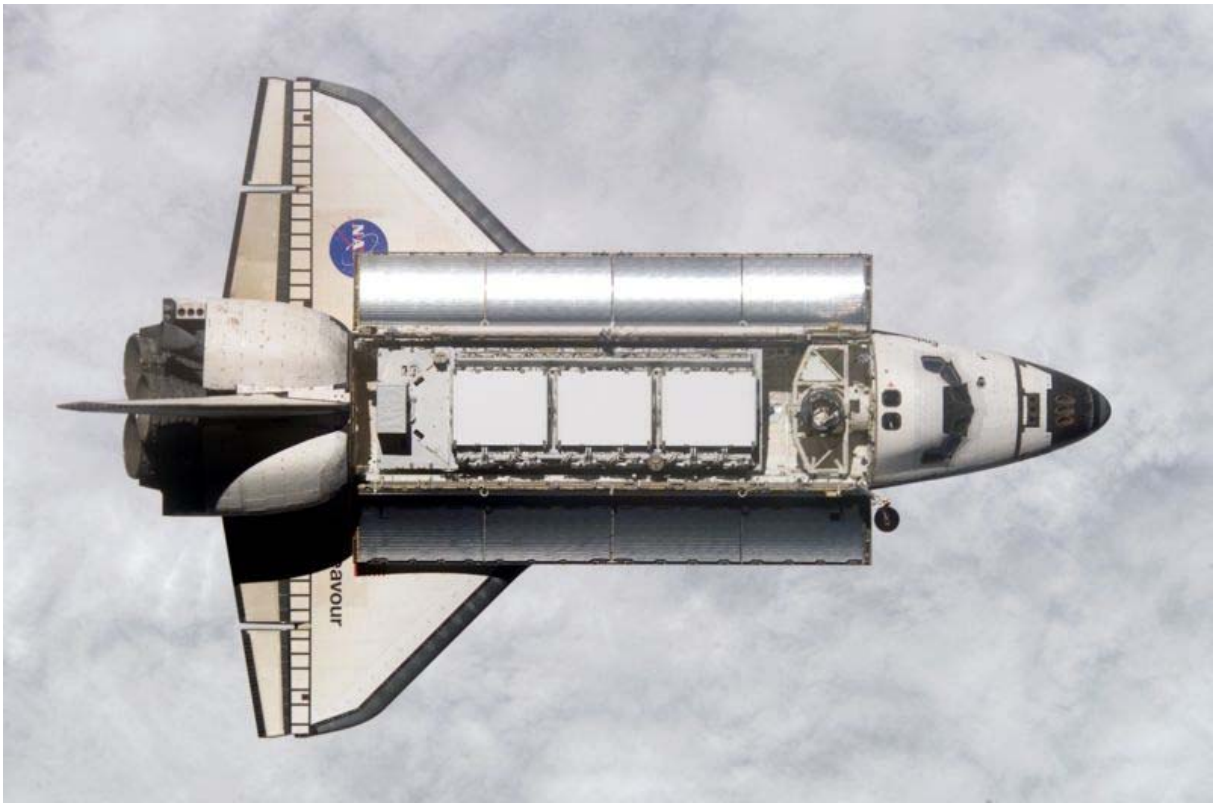
Enterprise was used only for approach and landing tests, launching from the back of a Boeing 747 SCA and gliding to deadstick landings at Edwards AFB, California. The first Space Shuttle to fly into space was Columbia, followed by Challenger, Discovery, Atlantis, and Endeavour. Endeavourwas built to replace Challenger when it was lost in January 1986. Columbia broke up during reentry in February 2003.

The first automatic partially reusable spacecraft was the Buran-class shuttle, launched by the USSR on November 15, 1988, although it made only one flight and this was unmanned. This spaceplane was designed for a crew and strongly resembled the U.S. Space Shuttle, although its drop-off boosters used liquid propellants and its main engines were located at the base of what would be the external tank in the American Shuttle. Lack of funding, complicated by the dissolution of the USSR, prevented any further flights of Buran. The Space Shuttle was subsequently modified to allow for autonomous re-entry in case of necessity.

Per the Vision for Space Exploration, the Space Shuttle was retired in 2011 due mainly to its old age and high cost of program reaching over a billion dollars per flight. The Shuttle's human transport role is to be replaced by SpaceX's Dragon V2 and Boeing's CST-100 Starliner no later than 2017. The Shuttle's heavy cargo

transport role is to be replaced by expendable rockets such as the Space Launch System and SpaceX's Falcon Heavy.

Scaled Composites' SpaceShipOne was a reusable suborbital spaceplane that carried pilots Mike Melvill and Brian Binnie on consecutive flights in 2004 to win the Ansari X Prize. The Spaceship Company will build its successor SpaceShipTwo. A fleet of SpaceShipTwo's operated by Virgin Galactic was planned to begin reusable private spaceflight carrying paying passengers in 2014, but was delayed after the crash of VSS Enterprise.



A Space Shuttle in orbit around Earth