NASA Facts

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International Space Station **January 1999**

UNITY CONNECTING MODULE: CORNERSTONE FOR A HOME IN ORBIT

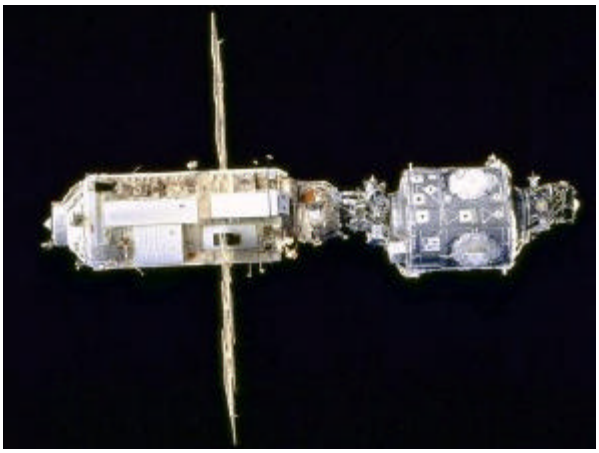
The First U.S.-Built International Space Station Component

The first U.S.-built component of the International Space Station, a six-sided connecting module and passageway, or node, named Unity, was the primary cargo of Space Shuttle mission STS-88, launched in December 1998 as the first mission dedicated to assembly of the station.

Unity lifted from Endeavour's cargo bay to prepare for attachment to the Zarya control module in December 1998 on shuttle mission STS-88

Now permanently attached to the Zarya control module in orbit, the Unity connecting module lays a foundation for all future U.S. International Space Station modules. Unity has six berthing ports, one on each side, one of which already is attached to Zarya. Future U.S. station modules and station components will attach to the remaining five ports. Built by The Boeing Company at a manufacturing facility at the Marshall Space Flight Center in Huntsville, Alabama, Unity is the first of three such connecting modules that will be built for the station. Sometimes referred to as Node 1, the Unity module measures 15 feet in diameter and 18 feet long. Including mating adapters attached at each end as is currently the case in orbit, the overall component measures about 34 feet long.

Carried to orbit aboard the Space Shuttle Endeavour, Unity was mated on Dec. 6, 1998, with the already orbiting Zarya, a U.S.-funded and Russian-built component launched earlier aboard a Russian Proton rocket from Kazakstan. In addition to connecting to Zarya module, Unity eventually will provide attachment points for the U.S. laboratory module; Node 3; an early exterior framework, or truss for the station, called the Z-1 truss; an airlock; and a multi-windowed cupola.



Unity, right, attached to Zarya in orbit

Essential space station resources such as fluids, environmental control and life support systems, electrical and data systems are routed through Unity to supply work and living areas of the station. More than 50,000 mechanical items, 216 lines to carry fluids and gases, and 121 internal and external electrical cables using six miles of wire were installed in the Unity node. Unity is made of aluminum.

Two conical docking adapters were attached to each end of Unity prior to its launch aboard Endeavour. The adapters, called pressurized mating adapters (PMAs), allow the docking systems used by the Space Shuttle and by Russian modules to attach to the node's hatches and berthing mechanisms. One of the conical adapters now permanently attaches Unity to Zarya, while the other provides a Shuttle docking port. Unity and the two mating adapters weigh about 25,600 pounds. Attached to the exterior of the mating adapter that permanently attaches Unity to Zarya are computers, or multiplexer-demultiplexers (MDMs), which provide early command and control of Unity. Unity also is outfitted with an early communications system that allows data, voice and low data rate video with Mission Control, Houston, to supplement Russian communications systems during the early station assembly activities.

The two remaining station connecting modules, or nodes, are being built by the European Space Agency (ESA) for NASA in Italy by Alenia Aerospazio. Nodes 2 and 3 will be slightly longer than the Unity node, measuring almost 21 feet long, and each will hold eight standard space station equipment racks in addition to six berthing ports. ESA is building the two additional nodes as partial payment for the launch of the ESA Columbus laboratory module and other equipment on the Space Shuttle. Unity holds four equipment racks.

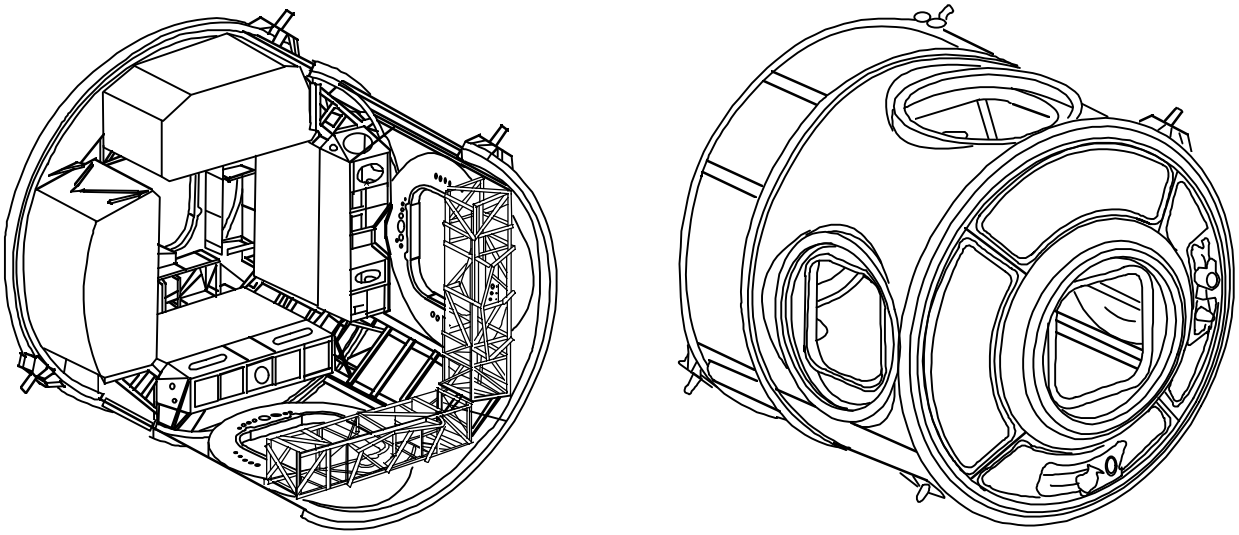


Diagram of interior and exterior views of Unity connecting module