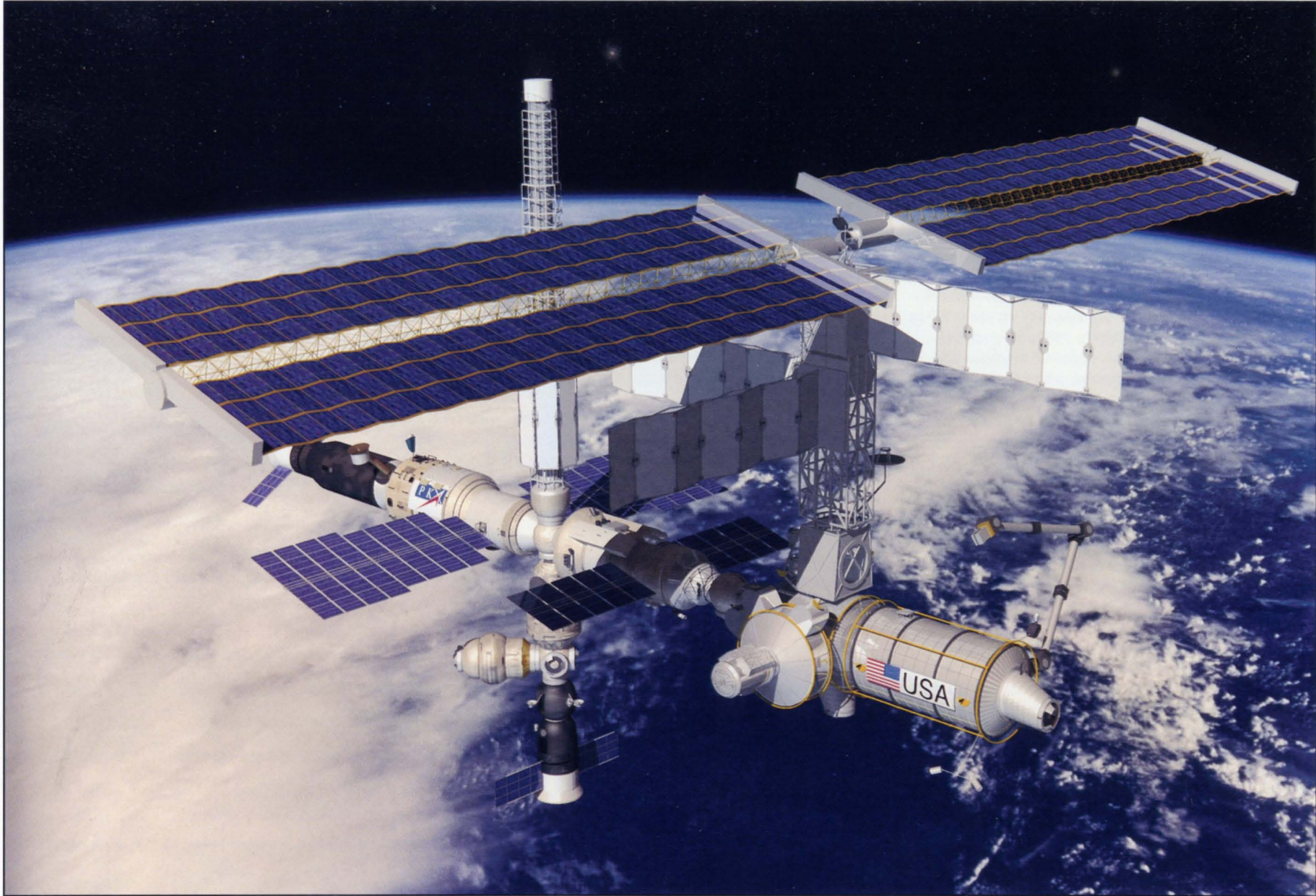




National Aeronautics and  
Space Administration

## International Space Station: Phase 2





## International Space Station: Phase 2: Assembly Begins

The international Space Station program has three distinct phases, each building on the one prior and representing new milestones and capabilities. Phase 1 builds joint space experience and begins scientific research between the US and Russian partners. Phase 1 missions include crew exchanges, space shuttle flights to the Russian space station *Mir*, and joint on-orbit operations.

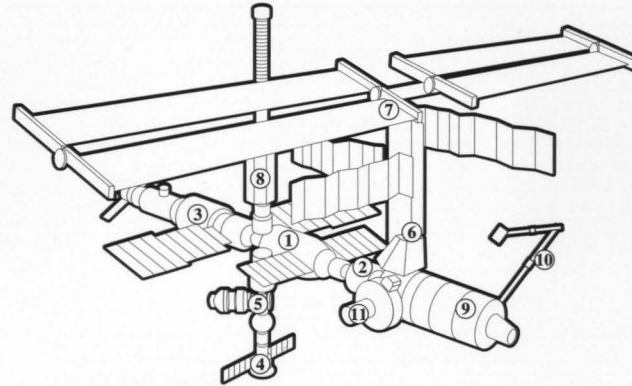
During Phase 2, actual construction of the new International Space Station begins. The US space shuttle and Russian rockets launch space station hardware—built in the US, Russia and Canada—for assembly on orbit. When the Phase 2 missions end in March 1999, the evolving space station will look like this technical rendition and will be ready to support continuous scientific research with three-person crews.

### Phase 2 Space Station Elements

In November 1997, the first element of the space station will be launched on a Russian Proton rocket. The **Functional Cargo Block (1), FGB**, is a 20-ton automated spacecraft that provides attitude control and propulsion during early assembly phases, plus solar power and berthing ports for additional modules. The FGB shares a common design with several *Mir* modules.

The shuttle delivers its first station hardware to orbit on STS-88 a month later. Endeavour will berth (2) **Node 1** at the front end of the FGB. Node 1 provides storage for supplies, attachment points for modules and the station's large truss, and a docking port for the shuttle. The US and Russian segments of the international Space Station also permanently link up at Node 1.

In spring 1998, the Russians launch the (3) **Service Module**, with living and working room for three crew members, that docks at the FGB aft port. The service



module, resembling the core *Mir* module, contains all systems necessary for independent orbital operations and handles station attitude control and reboost.

Early that summer, with the docking of a (4) **Soyuz crew transfer vehicle**, the international Space Station can accommodate three-person crews on a permanent basis. The Soyuz transfer vehicle assures return to Earth of crews when the space shuttle is not present or in case of emergency.

In June, Russia will launch the (5) **Universal Docking Module (UDM)** that serves as a docking port for research modules, a Life Support Module and another Soyuz transfer vehicle. In addition, the first segment of the station truss, called (6) **Z1**, will be attached by the crew of STS-91 along with communication and other equipment. Later shuttle flights will add more truss, and a (7) **solar power module and array** to the station.

The (8) **Science Power Platform (SPP)**, launched on a Russian Zenit rocket, provides power and heat rejection for station science and operations.

A major Phase 2 milestone is achieved in November when the (9) **US Laboratory Module** is carried to the station

onboard the shuttle. When fully outfitted, the US Lab Module carries 13 experiment racks, plus life support, maintenance and control systems.

Later that year, the (10) **Space Station Remote Manipulator System (SSRMS)** arrives. The 55-foot robot arm, built by Canada, can move up to 125 tons of modules and equipment. The robotic system assists with assembly, spacewalks, regular space station maintenance or repairs.

On STS-95, Atlantis' crew begins outfitting the US laboratory, making it ready for the first utilization flight in February 1999. With the berthing of the (11) **airlock and its high pressure gas tanks** in March, the station can support spacewalks, and Phase 2 construction of the international Space Station officially ends.

## Significant Dates

Date	Payload/Milestone
11/97	First Element Launch—FGB energy block on Proton Rocket
12/97	Node 1 launch on space shuttle
4/98	Russian service module launch
5/98	Soyuz crew transfer vehicle launch—3-person crews now can permanently live and work on the space station
6/98	Universal Docking Module and first truss segment launched on Russian and US vehicles
9/98	US solar array launched
11/98	US laboratory module
12/98	Space Station Remote Manipulator System (Canada)
2/99	First utilization flight completes outfitting of the US lab module
3/99	Airlock delivered to station—Phase 2 ends