ISS Intergovernmental Agreement

Artist's impression, current configuration of the ISS. (Image: ESA/D.Ducros)

The International Space Station is a co-operative programme between United States, Russia, Canada, Japan and eleven Member States of the European Space Agency (Belgium, Denmark, France, Germany, Italy, The Netherlands, Norway, Spain, Sweden and Switzerland).

It is governed by an international treaty, signed by these Member States on 29 January 1998, called the ISS Intergovernmental Agreement, which provides the framework for design, development, operation, and utilisation of a permanently inhabited civil Space Station for peaceful purposes.

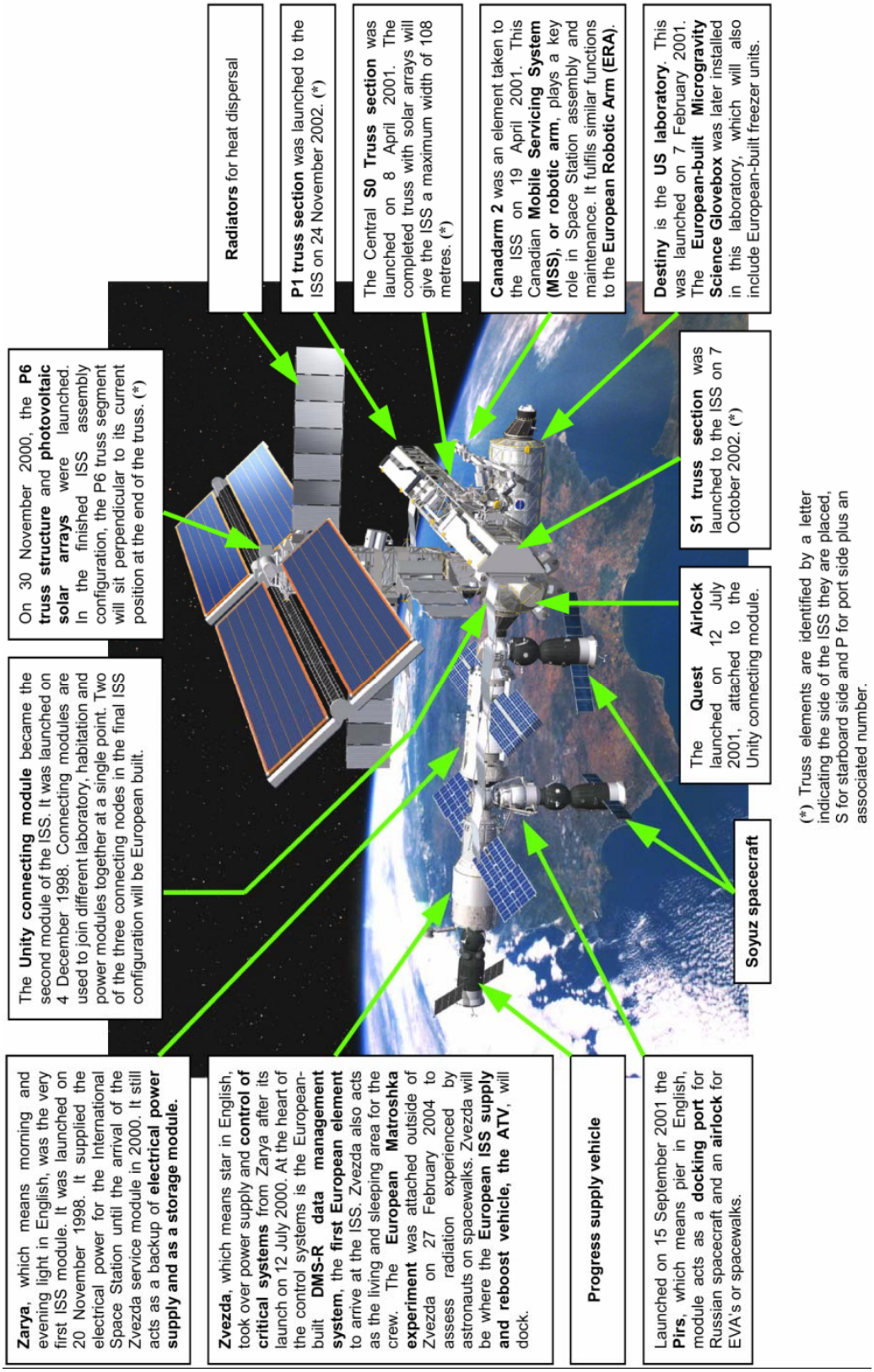
Furthermore, bilateral Memoranda of Understanding exist between NASA and each of the four associated space agencies: The European Space Agency (ESA), Russian Federal Space Agency, (FKA or Roscosmos, formerly Rosaviakosmos), the Canadian Space Agency (CSA) and the Japanese Space Agency (JAXA, formerly NASDA), outlining relevant ISS responsibilities, obligations and rights between the agencies.

National jurisdiction of the International Partner States extends to the ISS elements in orbit. This applies to areas such as criminal matters, liability issues, and protection of intellectual property rights.

Utilisation rights are outlined in the Memoranda of Understanding. The European Space Agency allocation rights comprise 8.3% of the Space Station utilisation resources including, in particular, 8.3% of crew time, which represent approximately 13 hours per week. In compensation for the provision of the resources (energy, robotics, cooling, telecommunications, etc.) to the Columbus Laboratory by NASA and CSA, Europe provides 49% of the laboratory's utilisation resources to NASA and 2% to the CSA.

One important point is that ESA and the other Space Station International Partners can barter or sell their unused utilisation rights among themselves and to other non-participants to the Station 's programme.

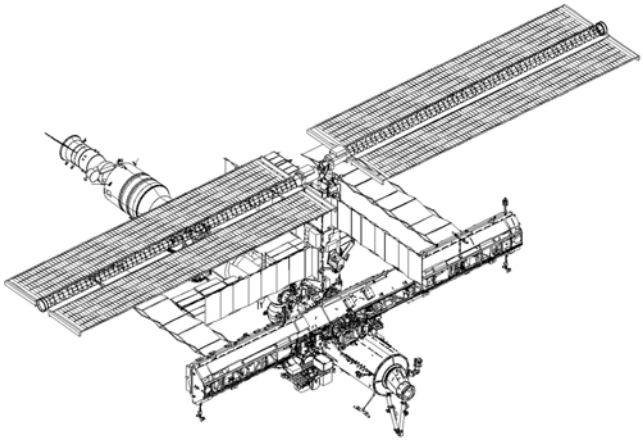
ISS Current Configuration



ISS Current Configuration (Image: ESA/D.Ducros)

Changes to ISS Configuration

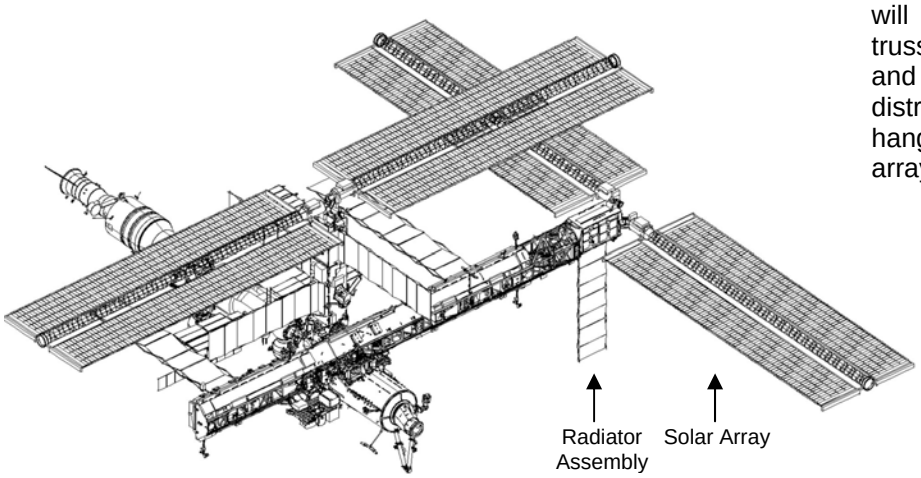
During the Astrolab mission, two major ISS assembly flights will take place, bringing the International Space Station closer to completion. The STS-115 mission will be the first of these two shuttle missions on ISS assembly flight 12A followed by the STS-116 mission (Reiter's return flight) on ISS assembly flight 12A.1.



ISS configuration following STS-121 mission. (Image: NASA)

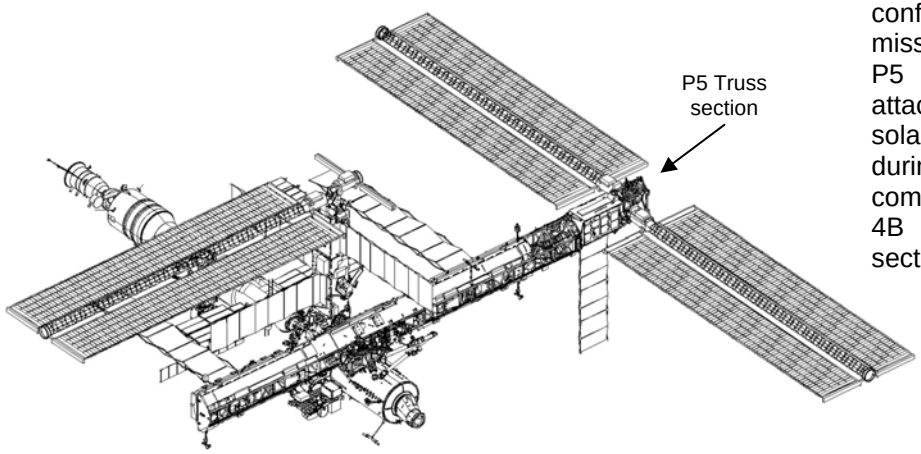
The image to the left is configuration of the ISS following departure of the Shuttle flight STS-121. This is the same as the current configuration except with the addition of Orbital Replacement Units on the External Stowage Platform 2, which is attached to the Quest airlock.

As seen in the image below following the STS-115 mission the ISS configuration will look considerably different. This mission will see the addition of the P3/P4 truss segment and solar arrays 4A and 2A. This will include a heat distribution radiator assembly seen hanging perpendicular to the solar arrays.



ISS configuration following STS-115 mission. (Image: NASA)

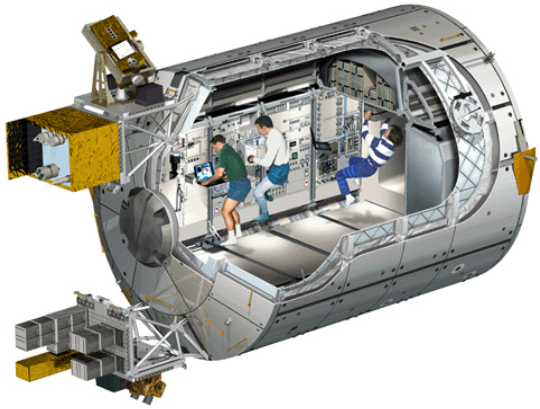
The major change to the ISS configuration following the STS-116 mission will be the installation of the P5 truss section. This is shown attached to the ISS truss between solar arrays 4A and 2A, installed during the STS-115 mission. As compared to the previous image the 4B solar array on the P6 truss section is shown retracted.



ISS configuration following STS-116 mission. (Image: NASA)

ISS and Europe's Major Contributions

Columbus Laboratory



The European Columbus laboratory. (Image: ESA/D.Ducros)

Columbus is ESA's Research laboratory. It provides space for research facilities in the fields of material science, fluid physics and life science. In addition, an external payload area can accomodate experiments and applications in the fields of space science, Earth observation, technology and innovative sciences from space. Columbus will be permanently stationed at the International Space Station attached to another European-built module, Node 2. It is planned for launch with Shuttle in 2007.

Automated Transfer Vehicle (ATV)

The Automated Transfer Vehicle. (Image: ESA/D.Ducros)

The Automated Transfer Vehicle is Europe's unmanned supply vehicle for the ISS. It will take up to 9 tons of cargo to the ISS, boost the station to a higher orbiting altitude and remove up to 6.5 tons of waste from the station. It measures approximately 10 metres long by 4.5 metres in diameter, with solar arrays spanning more than 22 metres for generating its electrical power. Cargo transported will include pressurised cargo, water, air, nitrogen, oxygen and attitude control propellant. The first planned launch is in 2007.

Node 2 and Node 3

ESA-developed Node 2 (top), the attachment point of the Columbus Laboratory and Node 3 (bottom). Node 3 will be the attachment point of the Cupola. (Image: ESA/D.Ducros)

Nodes are pressurised modules that interconnect the research, habitation, control and docking modules of the ISS. The Nodes are used to

control and distribute resources between the connected elements. The ISS will have three Nodes. Node 1, called Unity, was developed by NASA. It became the second module of the ISS in orbit after its launch in December 1998. Node 2 and 3 are developed under an ESA contract with European industry with Alenia Spazio as the prime contractor.

The European Robotic Arm (ERA). (Image: ESA/D. Ducros)

Node 2 will be the first European Node launched. It will act as a connection point for the European Columbus laboratory, the US Laboratory Destiny and the Japanese Laboratory Kibo. It also will be the attachment point for the Japanese HII Transfer Vehicle, carry a docking adapter for the US Space Shuttle, and act as an attachment point for the Multi-Purpose Logistics Module (MPLM). The MPLM is a pressurised cargo container, which travels in a space shuttle cargo bay. Node 2 also provides a working base point for the Space Station Remote Manipulator System, a Canadian robotic arm on the ISS called Canadarm 2.

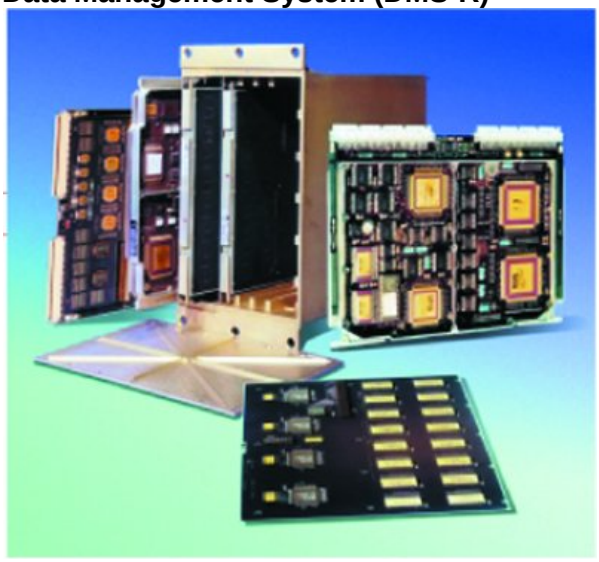
Node 3 will be the second European node to arrive at the ISS and will be attached to the American-built Node 1, which was launched to the ISS in December 1998. The forward port of Node 3 will act as the connecting point for the European-built Cupola.

Ownership for Node 2 has been, and for Node 3 will be, transferred to NASA within the framework of a barter agreement between ESA and NASA.

European Robotic Arm (ERA)

The European Robotic arm or ERA is a robotic arm, which serves to install solar arrays on the Russian section of the ISS. It further acts as an inspection tool on the Russian segment of the ISS and can carry out additional assembly and replacement tasks on the external surface of the station such as on the Russian Research Module and Multipurpose Laboratory Module. The 11-metre long ERA also serves to support or transfer astronauts carrying out tasks on spacewalks. It has an extensive range, as it is able to walk around the Russian segment of the station and while in orbit is able to manipulate up to 8000kg of mass. ERA is scheduled to arrive at the ISS in November 2007.

Data Management System (DMS-R)



The European-built Data management System. (Image: ESA)

Europe's DMS-R Data Management System was the first piece of European hardware on the ISS in July 2000. It includes two fault-tolerant computers and two control posts. It is the 'brain' or control centre of the Russian Segment of the ISS and carries out a great degree of the vital and fundamental functions on the station including: guidance, navigation and control of the entire ISS; failure management and recovery; and control of additional ISS systems and subsystems.

Cupola Observation Module

Artist's impression. Cupola observation Module attached to Node 3. (Image: ESA/D. Ducros)

The Cupola will become a panoramic control tower for the International Space Station (ISS), a dome-shaped module with windows through which operations on the outside of the Station can be observed and guided. It is a pressurised observation and work area that will accommodate command and control workstations and other hardware.

Through the Robotics Work Station, astronauts will be able to control the Space Station's robotic arm, which helps with the attachment and assembly of the various Station elements.

However, the Cupola will operate as more than a workstation. With a clear view of Earth and celestial bodies, the Cupola will have scientific applications in the areas of Earth Observation and Space Science as well as holding psychological benefits for the crew.