

ISS Intergovernmental Agreement



The International Space Station photographed from Shuttle Atlantis following undocking during the STS-117 mission in June 2007.
(Image: NASA)

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.

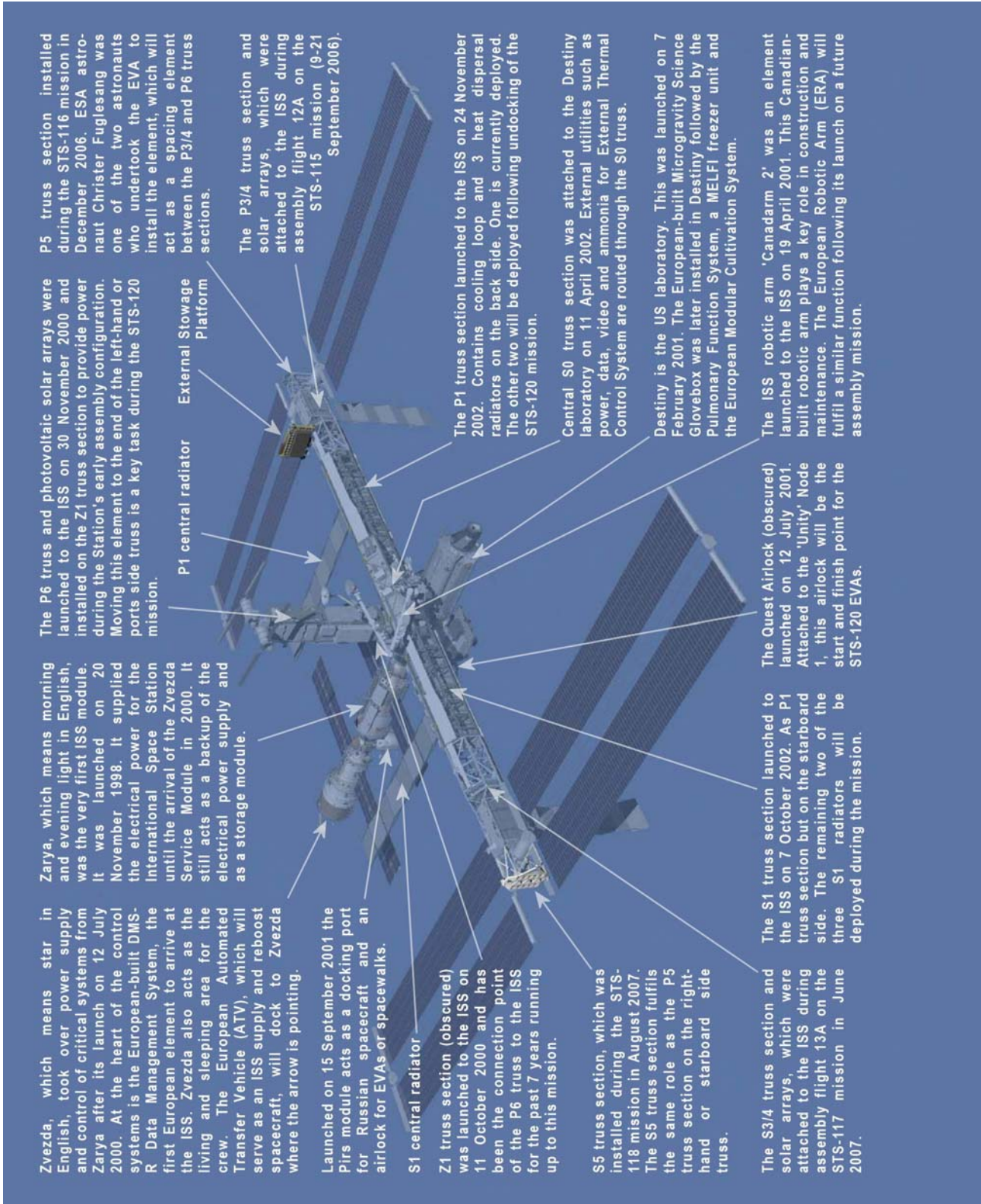
National jurisdiction of the International Partner States extends to the ISS elements in orbit. This applies to areas such as criminal matters, liability issues, and protection of intellectual property rights.

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.

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ISS Current Configuration



Zvezda, which means star in English, took over power supply and control of critical systems from Zarya after its launch on 12 July 2000. At the heart of the control systems is the European-built DMS-R Data Management System, the first European element to arrive at the ISS. Zvezda also acts as the living and sleeping area for the crew. The European Automated Transfer Vehicle (ATV), which will serve as an ISS supply and reboost spacecraft, will dock to Zvezda where the arrow is pointing.

Launched on 15 September 2001 the Pirs module acts as a docking port for Russian spacecraft and an airlock for EVAs or spacewalks.

S1 central radiator

Z1 truss section (observed) was launched to the ISS on 11 October 2000 and has been the connection point of the P6 truss to the ISS for the past 7 years running up to this mission.

S5 truss section, which was installed during the STS-118 mission in August 2007. The S5 truss section fulfils the same role as the P5 truss section on the right-hand or starboard side truss.

The S5/4 truss section and solar arrays, which were attached to the ISS during assembly flight 13A on the STS-117 mission in June 2007.

The P6 truss and photovoltaic solar arrays were launched to the ISS on 30 November 2000 and installed on the Z1 truss section to provide power during the Station's early assembly configuration. Moving this element to the end of the left-hand or ports side truss is a key task during the STS-120 mission.

P1 central radiator

External Stowage Platform

The P5 truss section installed during the STS-116 mission in December 2006. ESA astronaut Christer Fuglesang was one of the two astronauts who undertook the EVA to install the element, which will act as a spacing element between the P3/4 and P6 truss sections.

The P3/4 truss section and solar arrays, which were attached to the ISS during assembly flight 12A on the STS-115 mission (9-21 September 2006).

The P1 truss section launched to the ISS on 24 November 2002. Contains cooling loop and 3 heat dispersal radiators on the back side. One is currently deployed. The other two will be deployed following undocking of the STS-120 mission.

Central S0 truss section was attached to the Destiny laboratory on 11 April 2002. External utilities such as power, data, video and ammonia for External Thermal Control System are routed through the S0 truss.

Destiny is the US laboratory. This was launched on 7 February 2001. The European-built Microgravity Science Glovebox was later installed in Destiny followed by the Pulmonary Function System, a MELFI freezer unit and the European Modular Cultivation System.

The ISS robotic arm 'Canadarm 2' was an element launched to the ISS on 19 April 2001. This Canadian-built robotic arm plays a key role in construction and maintenance. The European Robotic Arm (ERA) will fulfil a similar function following its launch on a future assembly mission.

The Quest Airlock (observed) launched on 12 July 2001. Attached to the 'Unity' Node 1, this airlock will be the start and finish point for the STS-120 EVAs.

The S1 truss section launched to the ISS on 7 October 2002. As P1 truss section but on the starboard side. The remaining two of the three S1 radiators will be deployed during the mission.

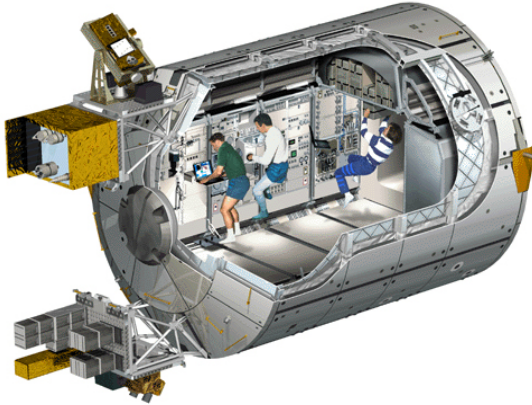
The S1 truss section launched to the ISS on 7 October 2002. As P1 truss section but on the starboard side. The remaining two of the three S1 radiators will be deployed during the mission.

ISS Current Configuration. (Image: NASA/Text: ESA)

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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 accommodate 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 Atlantis in December 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 launch is planned for no earlier than January 2008.

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

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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 ASI contract with European industry with Thales Alenia Space 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 2009.

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 three 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.

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Cupola Observation Module



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

The Cupola will become a panoramic control post 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.