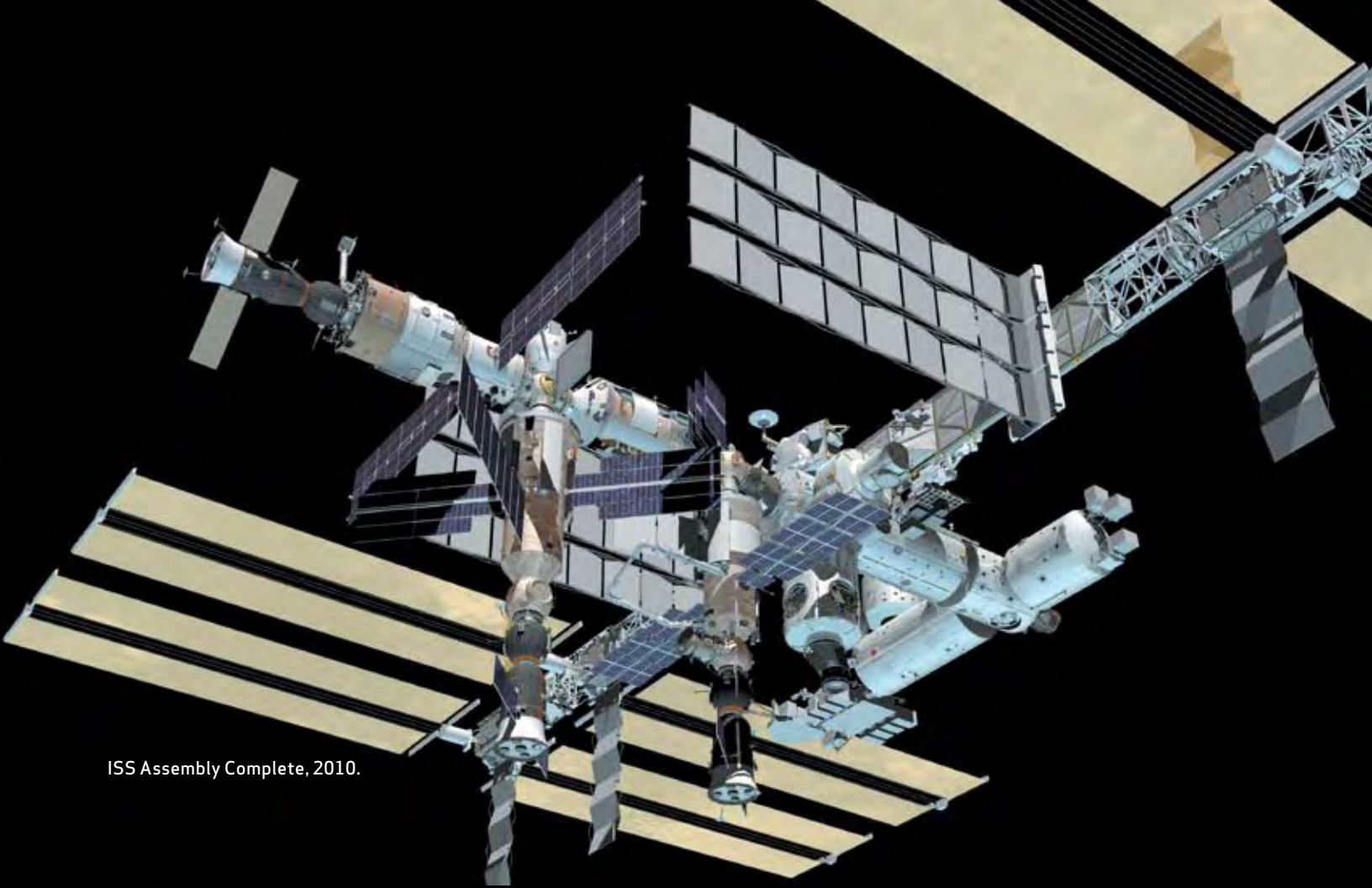


assembly stages

As of mid-2006, the International Space Station (ISS) has been continuously crewed for more than 5 years and is about 50 percent complete with approximately 180 metric tonnes (198 tons) of mass on orbit. There are 16 elements in orbit today, 9 elements ready for launch at Kennedy Space Center in Florida, and 6 elements in process at international partner sites. When the assembly is complete, the ISS will be composed of about 420,000 kilograms (925,000 pounds) of hardware brought to orbit in about 40 separate launches over the course of more than a decade. To date, there have been over 50 flights to the ISS, including flights for assembly, crew rotation, and logistical support.



ISS Assembly Complete, 2010.



ISS, June 2006.



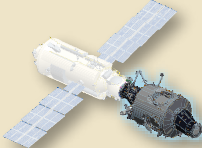

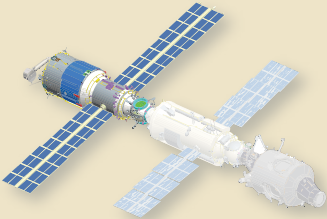

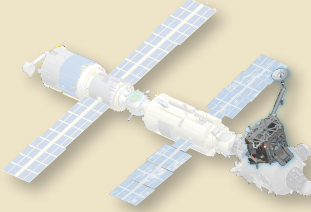

	ISS, June 2006	ISS Assembly Complete, 2010
Length	52 m (171 ft)	74 m (243 ft)
Width	73 m (240 ft)	110 m (361 ft)
Mass	186,000 kg (410,000 lb)	419,600 kg (925,000 lb)
Pressurized volume	449 m ³ (15,860 ft ³)	935 m ³ (33,023 ft ³)
Array surface area	892 m ² (9,600 ft ²)	2,500 m ² (27,000 ft ²)
Power	26 kW	110 kW

Principal Stages in Construction

The ISS, at Assembly Complete, is to be the largest humanmade object ever to orbit Earth. The ISS is to have a pressurized volume of 935 m³ (33,023 ft³), a mass of 419,600 kg (925,000 lb), maximum power output of 110 kW, with a payload long-term average power allocation of 30 kW, a structure that measures 110 m (361 ft) (across arrays) by 74 m (243 ft) (module length), an orbital altitude of 370–460 km (230–286 mi), an orbital inclination of 51.6°, and a crew of six.

Building and sustaining the ISS requires 80 flights over a 12-year period. As of 2006, 21 flights have been flown in support of ISS assembly. As many as another 17 Shuttle missions and 2 Russian launches are currently planned to complete the assembly. Currently, logistics is supported by the Space Shuttle, Progress, and Soyuz.

Future logistics/resupply missions will also be provided by the European Automated Transfer Vehicle (ATV) and Japan's H-II Transfer Vehicle (HTV). The U.S. Crew Exploration Vehicle (CEV) and commercial systems will support ISS logistics in the future.




STAGE/DATE	ELEMENT ADDED	LAUNCH VEHICLE	
1A/R Nov. 1998	 Functional Cargo Block (FCB).	Proton	
2A Dec. 1998	 Node 1, Pressurized Mating Adapter (PMA) 1, 2.	Space Shuttle STS-88	
1R July 2000	 Service Module (SM).	Proton	
3A Oct. 2000	 Zenith 1 (Z1) Truss, PMA 3.	Space Shuttle STS-92	





A=U.S. Assembly

J=Japanese Assembly




E=European Assembly




R=Russian Assembly

STAGE/DATE	ELEMENT ADDED	LAUNCH VEHICLE	
4A Dec. 2000	Port 6 (P6) Truss.	Space Shuttle STS-97	
5A Feb. 2001	U.S. Lab.	Space Shuttle STS-98	
6A Apr. 2001	Space Station Remote Manipulator System (SSRMS).	Space Shuttle STS-100	
7A July 2001	U.S. Airlock.	Space Shuttle STS-104	

STAGE/DATE	ELEMENT ADDED	LAUNCH VEHICLE	
4R Sept. 2001	Russian Docking Compartment (DC) and Airlock.	Soyuz	
8A Apr. 2002	Starboard Zero (S0) Truss.	Space Shuttle STS-110	
9A Oct. 2002	S1 Truss.	Space Shuttle STS-112	
11A Nov. 2002	P1 Truss.	Space Shuttle STS-113	

A=U.S. Assembly J=Japanese Assembly E=European Assembly R=Russian Assembly

STAGE/DATE	ELEMENT ADDED	LAUNCH VEHICLE	
12A Aug. 2006	P3/P4 Truss.	Space Shuttle STS-115	
12A.1	P5 Truss, retracting P6 arrays.	Space Shuttle STS-116	
13A	S3/S4 Truss.	Space Shuttle STS-117	




STAGE/DATE	ELEMENT ADDED	LAUNCH VEHICLE	
13A.1	S5 Truss.	Space Shuttle STS-118	
10A	Node 2, P6 relocated.	Space Shuttle STS-120	
1E	ESA Columbus Module.	Space Shuttle STS-122	




A=U.S. Assembly

J=Japanese Assembly

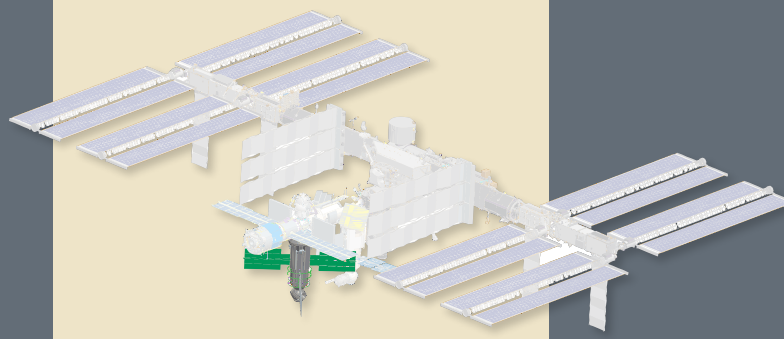
E=European Assembly

R=Russian Assembly

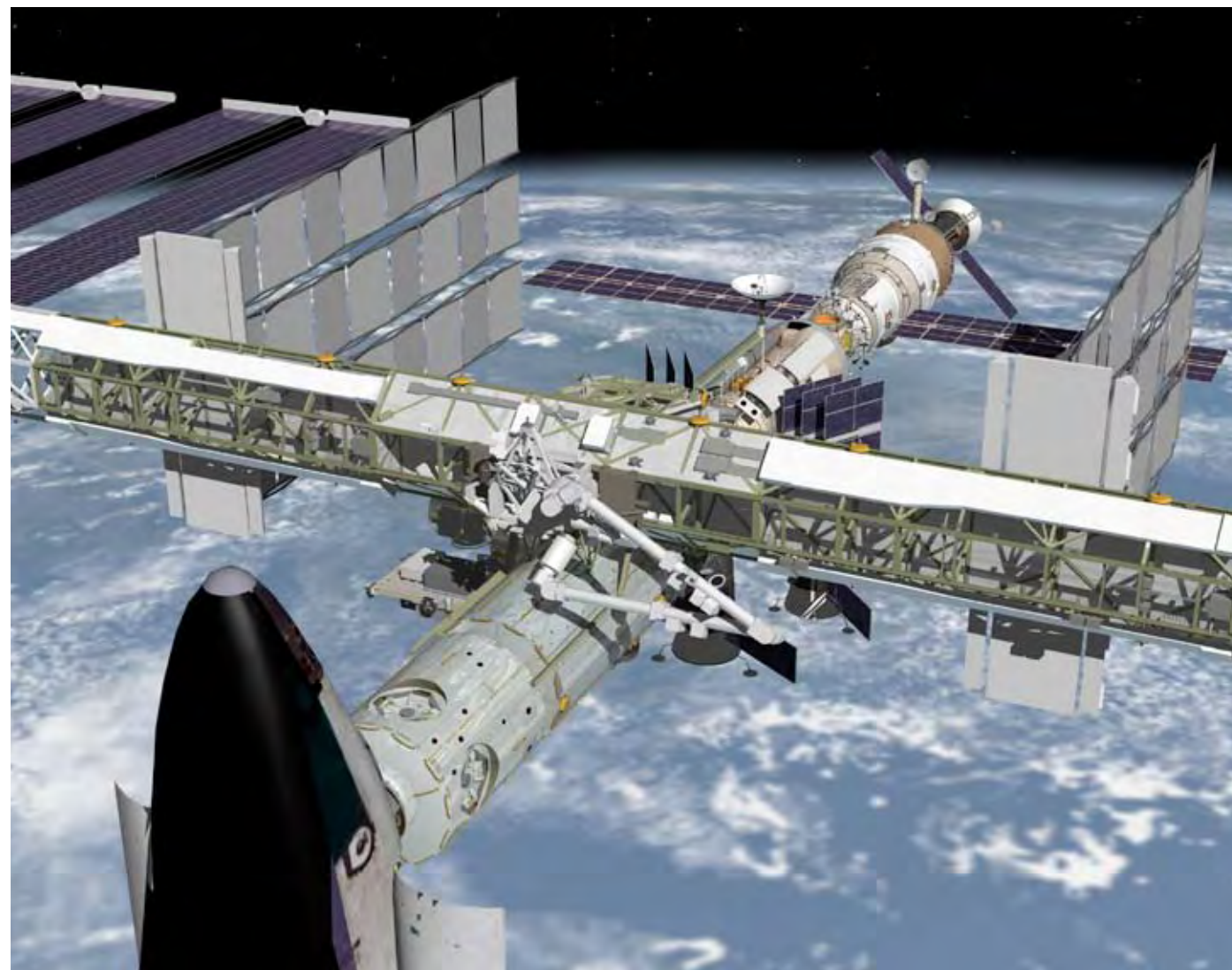
STAGE/DATE	ELEMENT ADDED	LAUNCH VEHICLE	
1J/A	Japanese Experiment Module Experiment Logistics Module Pressurized Section (JEM-ELM-PS), and Canadian Special Purpose Dexterous Manipulator (Dextre).	Space Shuttle	
1J	JEM Pressurized Module (PM).	Space Shuttle	
15A	S6 Truss.	Space Shuttle	

STAGE/DATE	ELEMENT ADDED	LAUNCH VEHICLE	
2 J/A	JEM-ELM Exposed Section (ES), JEM-Exposed Facility (JEM-EF).	Space Shuttle	
3R	Russian Multi-Purpose Laboratory Module.	Proton	
20A	Node 3 and Cupola.	Space Shuttle	

A=U.S. Assembly J=Japanese Assembly E=European Assembly R=Russian Assembly

STAGE/DATE	ELEMENT ADDED	LAUNCH VEHICLE
9R	 Russian Research Module.	Proton

A=U.S. Assembly J=Japanese Assembly E=European Assembly R=Russian Assembly



Space Shuttle docked to Node 2. SSRMS and Truss at top.

Current ISS On-Orbit Elements

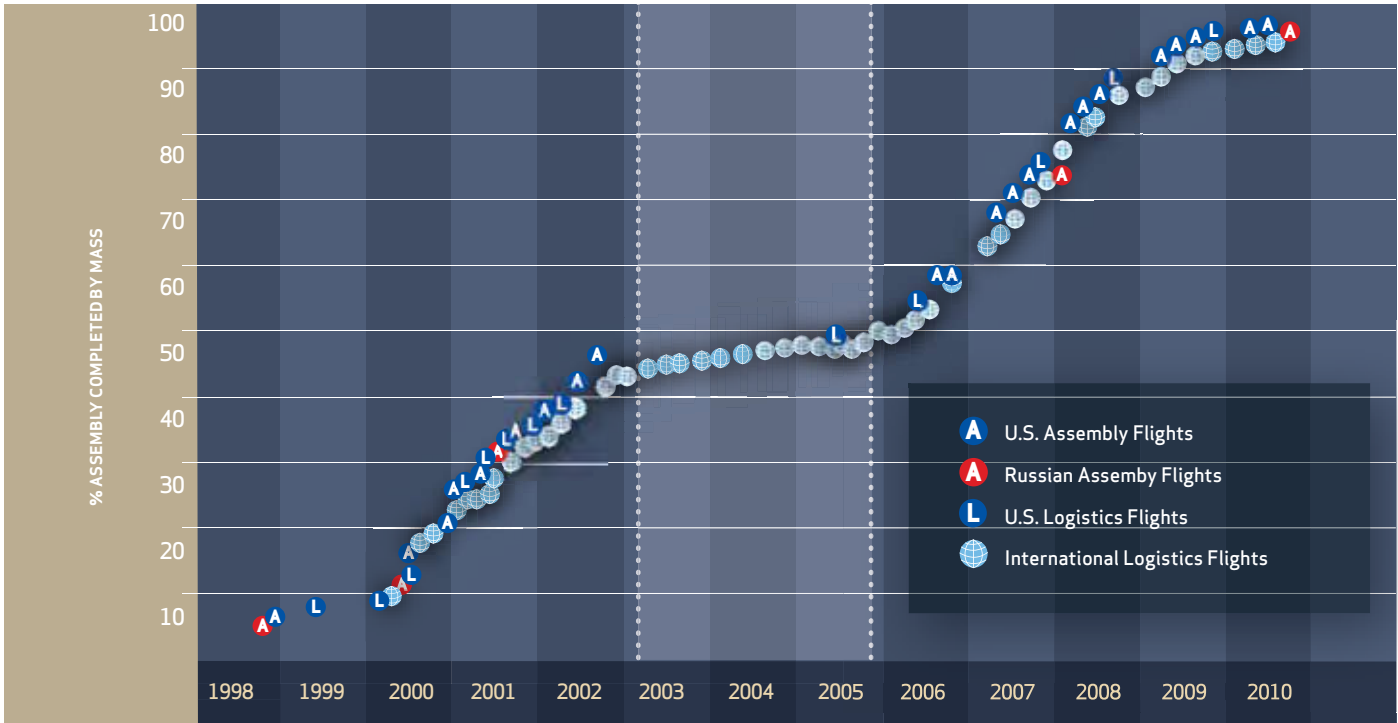
MODULE	LENGTH	MASS	LAUNCHED	LAUNCH VEHICLE
FGB (Zarya)	12.8 m (42 ft)	25,000 kg (55,000 lb)	11/20/98	Proton
Node 1 (Unity)/PMA 1 & 2	10.4 m (34 ft)	14,900 kg (33,000 lb)	12/04/98	STS-88
Service Module (Zvezda)	13.1 m (43 ft)	24,600 kg (54,200 lb)	7/12/00	Proton
Z1 Truss/PMA 3	4.6 m (15 ft)	8,755 kg (19,227 lb)/ 1,168 kg (2,575 lb)	10/11/00	STS-92
P6 Truss	18.3 m (60 ft) 73.2 m (240 ft) across extended solar array	14,550 kg (32,100 lb)	11/30/00	STS-97
U.S. Lab (Destiny)	8.5 m (28 ft)	24,100 kg (53,100 lb)	02/07/01	STS-98
SSRMS (Canadarm 2)	17.7 m (58 ft)	1,502 kg (3,311 lb)	04/19/01	STS-100
U.S. Airlock (Quest)	4.6 m (15 ft)	9,920 kg (21,900 lb)	07/12/01	STS-104
Docking Compartment/ Airlock (Pirs)	4.9 m (16 ft)	3,838 kg (8,461 lb)	09/15/01	Soyuz
S0 Truss/Mobile Transporter	13.4 m (44 ft)	12,100 kg (26,700 lb)	04/08/02	STS-110
Mobile Base System	5.8 m (19 ft)	1,450 kg (3,200 lb)	06/05/02	STS-111
S1 Truss	13.7 m (45 ft)	12,300 kg (27,100 lb)	10/07/02	STS-112
P1 Truss	13.7 m (45 ft)	12,300 kg (27,100 lb)	11/23/02	STS-113
Soyuz (typical)	7 m (22.9 ft)	7,167 kg (15,800 lb)	N/A	Soyuz
Progress (typical)	7.3 m (24 ft)	1,750 kg (3,850 lb)	N/A	Soyuz

Current and Future Totals

	LENGTH	WIDTH	VOLUME	MASS
June 2006	52 m (171 ft) with Progress	73 m (240 ft) across array	449 m ³ (15,860 ft ³)	186,000 kg (410,000 lb) 186 t (205 tons)
Assembly Complete	74 m (243 ft) with ESA ATV	108.5 m (356 ft) arrays extended	935 m ³ (33,023 ft ³)	419,600 kg (925,000 lb) 457 t (420 tons)

ISS Assembly Sequence

The table below shows the plan for completion. Assembly and logistics flights are plotted as a function of time and percent of total mass.



Important Dates

Nov. 20, 1998	First element launched (FGB)
Dec. 4, 1998	Shuttle mission carried first U.S. component, Node 1 (Unity)
July 12, 2000	Early living quarters launched by Russians, Service Module (Zvezda)
Nov. 2, 2000	Start of permanent human presence on the ISS (Expedition 1)
Nov. 2000	First set of U.S. arrays made the ISS the most powerful spacecraft ever
Feb. 2001	U.S. laboratory Destiny delivered (provided command and control and an experiment platform)
Apr. 2001	Canadian robotic arm extended the “reach” of the Station for assembly
July 2001	U.S. airlock Quest arrived, allowing U.S. spacewalks without the Shuttle
Apr. 2002	S0 Truss (central truss segment); Mobile Transporter launched
June 2002	Mobile Base System (platform on which SSRMS can attach for translation across truss) installed
Sept. 2002	S1 Truss installed
Nov. 2002	P1 Truss installed
July 2005	Space Shuttle Return to Flight (STS-114)—a logistics mission
2009	Six-person crew
2010	Assembly Complete