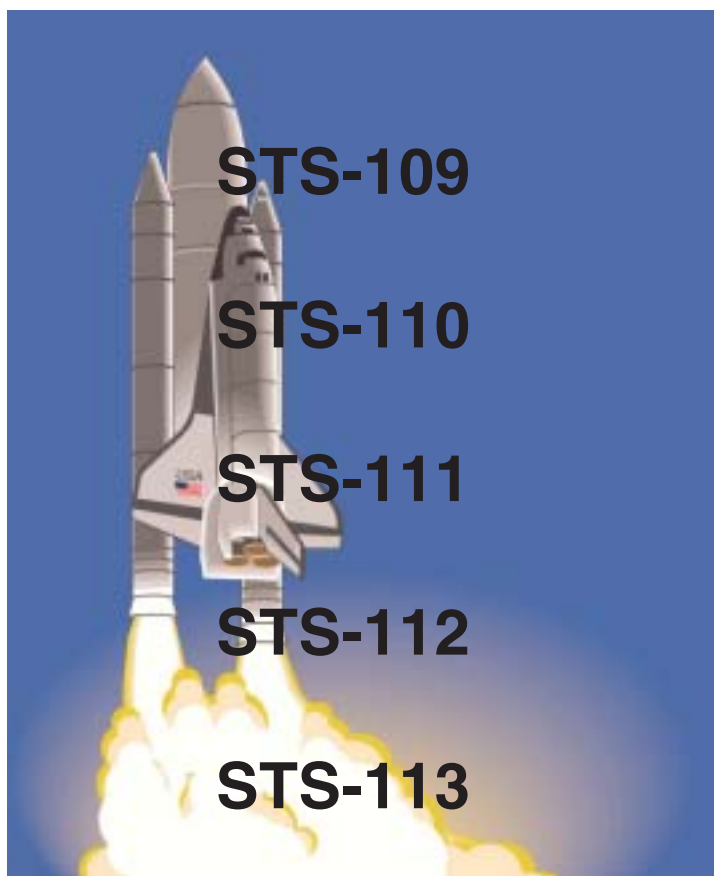


2002 Space Shuttle Mission Chronology





The Advanced Camera for Surveys (ACS) launched on STS-109 for maintenance of the Hubble Space Telescope. (See page 1.)

Atlantis launches on STS-110. (See page 2.)



Space Shuttle Endeavour roars toward space on mission STS-111. (See page 4.)



The view from the External Tank camera as Space Shuttle Atlantis launches on mission STS-112. (See page 5.)



Space Shuttle Endeavour blazes into the night sky on mission STS-113. (See page 6.)

2002

STS-109

(Hubble Space Telescope Servicing Mission 3B)

Columbia Pad 39A

108th Shuttle mission
27th flight OV-102
58th KSC landing



Crew:

Scott D. Altman, Commander (3rd Shuttle flight)
Duane G. Carey, Pilot (1st)
John M. Grunsfeld, Payload Commander (4th)
Nancy Jane Currie, Mission Specialist, (4th)
Richard M. Linnehan, Mission Specialist (3rd)
James H. Newman, Mission Specialist (4th)
Michael J. Massimino, Mission Specialist (1st)

Orbiter Preps (move to):

OPF - May 29, 2001
VAB - Jan. 16, 2002
Pad 39A - Jan. 28, 2002

Launch: March 1, 2002 at 6:22:02 a.m. EST

Prior to tanking activities, the scheduled launch on Feb. 28 was postponed 24 hours to March 1 when the launch weather forecast projected 38-degree temperature at the launch pad, which was at the margin of the acceptable limit in combination with the predicted wind speed and relative humidity. The forecast for a launch attempt on Friday called for a temperature approximately 10 degrees warmer. Waiting an additional 24 hours protected the option for two possible back-to-back launch opportunities for the launch team. Launch occurred without delay on March 1.

Landing: March 12, 2002 at 4:33:05 a.m. EST

Runway 33, Kennedy Space Center, Fla. Main landing gear touchdown: 4:31:53 a.m. Nose gear touchdown: 4:32:04 a.m. Wheelstop: 4:33:05 a.m. Rollout distance: 10,119 feet. Rollout time: 1 minute, 17 seconds. Mission elapsed time: 10 days, 22 hours, 11 minutes, 9 seconds. Landed on orbit 165. Logged about 3.9 million statute

miles. Landed on the first of two Florida landing opportunities. The landing marked the 58th landing at KSC in the history of the Shuttle program.

Mission Highlights:

The 11-day mission rejuvenated the Hubble Space Telescope in a series of five spacewalks. After grasping the telescope and pulling it into the payload bay, the spacewalkers, assisted by Mission Specialist Nancy Jane Currie operating the Shuttle's robotic arm, installed new and improved equipment that gave the telescope more power, a new module to dispense the power, and a camera able to see twice as much area, with more speed and clarity. They also installed an experimental cooling system in hope of restoring life to the Near-Infrared Camera and Multi-Object Spectrometer. Columbia performed perfectly.

EVA No. 1: 7 hours, 1 minute

Mission Specialists John Grunsfeld and Rick Linnehan removed the old starboard solar array from Hubble and installed in its place a new third-generation solar array. The two spacewalkers were maneuvered around Columbia's payload bay and Hubble telescope by the Shuttle's robotic arm, manipulated by Mission Specialist Nancy Currie. From the aft flight deck of Columbia, astronauts Michael Massimino and James Newman assisted the spacewalkers throughout their tasks. The old solar array was stored in Columbia's payload bay for return to Earth and evaluation of its nine-year performance.

EVA No. 2: 7 hours, 16 minutes

Mission Specialists Newman and Massimino installed a new port solar array and a new Reaction Wheel Assembly on Hubble after removing the old solar array. Again, the spacewalkers used the robotic arm to get to and from the worksite. Newman and Massimino also had time to install a thermal blanket on Bay 6, door stop extensions on Bay 5, and foot restraints to prepare for the third spacewalk by Grunsfeld and Linnehan. Testing two bolts on the telescope's aft shroud doors, they determined that bottom two bolts required replacement and they completed that task.

During the spacewalk Commander Altman and Pilot Carey documented the activity using television and still-photo cameras.

EVA No. 3: 6 hours, 48 minutes

A water leak in Grunsfeld's spacesuit delayed the start of the third EVA. After swapping the upper portion of the suit, he and Linnehan began work to replace the original, 12-year-old Power Control Unit with a new one capable of handling the extra 20 percent of power output being generated from the

newly installed solar panels. For the first time since its launch, Hubble was powered down, by controllers at the Space Telescope Operations Control Center, Greenbelt, Md. Linnehan first removed 30 of 36 connectors on the old PCU then switched places with Grunsfeld to prepare the new PCU. Grunsfeld unhooked the remaining six connectors and eased the PCU from the telescope, carrying it to the payload bay. Mission Specialist Currie again worked the robotic arm to maneuver the spacewalkers. Grunsfeld then installed the new PCU on the telescope and connectors were mated an hour and a half later. An hour later the new PCU passed its aliveness test.

EVA No. 4: 7 hours, 18 minutes

Mission Specialists James Newman and Michael Massimino completed the first science instrument upgrade of the servicing mission by installing the Advanced Camera for Surveys – it replaced the original Faint Object Camera. Afterward, Massimino installed the Electronic Support Module, the first part of an experimental cooling system to be installed on EVA no. 5.

EVA No. 5: 7 hours, 32 minutes

On the final spacewalk, Mission Specialists Grunsfeld and Linnehan removed the NICMOS cryocooler from its carrier in the payload bay and installed it inside the aft shroud, connecting cables from the Electronics Support Module. They retrieved the Cooling System Radiator from the payload bay and installed it on the outside of Hubble. Linnehan fed the radiator wires through the bottom of the telescope to Grunsfeld, who connected them to NICMOS.

The Hubble Space Telescope was released from the grasp of Columbia’s robotic arm at 5:04 a.m. EST March 9. The series of spacewalks to install the new and upgraded equipment set a new record for a single Shuttle mission with a total time of 35 hours, 55 minutes. The previous record was 36 hour, 26 minutes, set by STS-61, the first Hubble servicing mission.

Concerns

After a successful launch, flight controllers in Mission Control noticed a degraded flow rate in one of two freon cooling loops that help to dissipate heat from the orbiter. After reviewing the loop’s performance, mission managers gave the crew a “go” to proceed with normal operations. The problem had no impact on any of the crew’s activities. Both cooling loops performed normally on de-orbit and landing.

STS-110

(8A/13th flight to the ISS)

Atlantis
Pad 39B

109th Shuttle mission
25th flight OV-104
59th KSC landing



Crew:

- Michael Bloomfield, Commander (3rd Shuttle flight)
- Stephen Frick, Pilot (1st)
- Jerry Ross, Mission Specialist, (7th)
- Steven Smith, Mission Specialist, (4th)
- Ellen Ochoa, Mission Specialist (4th)
- Lee Morin, Mission Specialist (1st)
- Rex Walheim, Mission Specialist (1st)

Orbiter Preps (move to):

- OPF bay 2 - July 24, 2001
- VAB - March 6, 2002
- Pad 39B - March 12, 2002

Launch: April 8, 2002, at 4:44:19 p.m. EDT

The original April 4 launch was terminated about an hour into tanking operations due to a leak in a liquid hydrogen vent line of the Mobile Launcher Platform at Pad B. The launch was rescheduled for April 8. The repair work involved welding a 10-inch wide, two-piece aluminum clam shell sleeve around the 16-inch diameter line.

The countdown on April 8 went into an unscheduled hold at the 5-minute mark due to data dropouts in a backup Launch Processing System. The Launch Processing System team reloaded the required data and the countdown resumed. Liftoff occurred with 11 seconds remaining in the launch window.

Landing: April 19, 2002 at 12:28:08 p.m. EDT

Runway 33, Kennedy Space Center, Fla. Main gear touchdown: 12:26:58 p.m. EDT. Nose gear touchdown: 12:27:08. Wheel stop: 12:28:08. Rollout distance: 9576 feet. Rollout time: 1 minute, 10 seconds. Mission duration: 10 days, 19 hours, 42 minutes, 44 seconds. Landed on orbit 171. Logged about 4.5 million statute miles. Landed on the first of two Florida landing opportunities. The landing marked the 59th landing at KSC overall.

Mission Highlights:

The launch marked a milestone as Mission Specialist (MS) Jerry Ross became the first human to fly in space

seven times, breaking his own and other astronauts' records of six space flights. His two spacewalks gave him a total of 58 hours and 18 minutes, surpassed only by Russian cosmonaut Anatoly Solovyev in human space flight history.

Installation of the S0 truss was the primary objective and began with removal of the truss from Atlantis' payload bay. Mission Specialist Ellen Ochoa lifted it out with the Station's robotic arm and maneuvered it onto a clamp at the top of the Destiny Lab. The truss contains navigational devices, computers, cooling and power systems needed to attach additional laboratories to the complex. Four spacewalks were required for the task. The truss will serve as a platform on which other trusses will be attached and additional solar arrays will be mounted to form a 356-foot-long Space Station.

Between and during spacewalks, Shuttle and ISS crew members transferred experiments and supplies between the Shuttle and the Station. They also transferred oxygen from the Shuttle to one of four high-pressure gas tanks, used on the Quest Airlock to repressurize the module after spacewalks. Overall, 100 pounds of oxygen and 50 pounds of nitrogen were transferred.

Initial tests of the movement of the Mobile Transporter were successful. ISS Flight Engineer Walz commanded the transporter, via a laptop computer, to move to a work site 17 feet down a rail spanning the 44-foot-length of the girder, then to a second site and back to the first. Automatic latching did not occur due to minute lifting of the rail car but was accomplished by manual commands. Other transporter systems functioned perfectly.

Tasks not accomplished on the mission were removal of the balky bolt from the backup cable on the Mobile Transporter and installation of a gas analyzer on the truss. The gas analyzer, considered low priority on the flight, proved to be faulty.

EVA No. 1: 7 hours, 48 minutes

After the temporary latching, MS Rex Walheim and MS Steven Smith began the first of four spacewalks to electrically and structurally mate the truss to the Station. The spacewalking pair attached two of four mounting struts onto Destiny, deployed trays of avionics equipment and cables connecting Destiny to the truss, attached an umbilical system from the truss to the Mobile Transporter, and secured critical power connections. Walheim was the first spacewalker to use the Station's Canadarm 2 as a cherry picker, maneuvering to different areas for the assembly work. Smith operated as a "free-floater," tethered to the Station and other work sites around the truss. From the aft flight deck of the Shuttle, Ross and ISS Flight Engineer Carl Walz helped choreograph the spacewalk.

EVA No. 2: 7 hours, 30 minutes

MS Jerry Ross and MS Lee Morin bolted the final two struts of the S0 truss to the Destiny Lab. Morin used Canadarm 2 to work while Ross was tethered to the Station. The two removed support panels and clamps from the truss, used during launch, then installed a backup device with an umbilical reel for the Mobile Transporter railcar. A restraining bolt that needed to be removed did not perform as expected and was left for a later spacewalk.

EVA No. 3: 6 hours, 27 minutes

MS Smith and MS Walheim released the claw that initially held the truss to the Lab. They also reconfigured Canadarm 2 connectors for electricity from the Lab to be powered by the truss. Smith worked from the end of the Shuttle's robotic arm while Walheim was the free-floater, tethered to the Station. This was Smith's seventh spacewalk, second to Ross. Smith and Walheim also released clamps that secured the Mobile Transporter to the truss. A task to attach the Airlock Spur, a 14-foot ladder, from the truss to the Quest Airlock was delayed to the fourth EVA.

EVA No. 4: 6 hours, 37 minutes

MS Ross and MS Morin installed the 14-foot beam, the Airlock Spur, from the S0 truss to the Quest Airlock. The beam will provide a quick pathway for future spacewalkers working on truss assembly. Ross tested switches on both sides of the truss for future truss assembly. He and Morin installed floodlights on the Unity connecting Module and Destiny Lab to provide illumination for future spacewalks. Other activities included attaching a work platform on the Station for future construction work, installing electrical converters and circuit breakers, and attaching shock absorbers to the Mobile Transporter railcar. Ross used the Canadarm 2 for his work while Morin was the free-floater, tethered to the Station.

STS-111

(UF2/14th flight to the ISS)

Endeavour

Pad 39A

110th Shuttle mission
18th flight OV-105
49th EAFB landing



Crew:

Kenneth Cockrell, Commander (5th Shuttle flight)
Paul Lockhart, Pilot (1st)
Franklin Chang-Diaz, Mission Specialist, (7th)
Philippe Perrin, Mission Specialist, CNES (1st)

Expedition 5 (up)

Valery Korzun, RSA, Commander (2nd)
Peggy Whitson, Flight Engineer (1st)
Sergei Treschev, RSA, Flight Engineer (1st)

Expedition 4 (down)

Yuri Onufriyenko, RSA, Commander (1st)
Daniel Bursch, Flight Engineer (4th)
Carl Walz, Flight Engineer (4th)

Orbiter Preps (move to):

OPF bay 2 --- Dec. 17, 2001
VAB --- April 22, 2002
Pad 39A --- April 29, 2002

Launch: June 5, 2002, at 5:22:49 p.m. EDT

The launch originally set for May 30 was scrubbed due to weather concerns. It was rescheduled for May 31; technicians, however, had detected pressure differentials in the gaseous nitrogen pressure on the left Orbital Maneuvering System pod aboard Endeavour during the launch count on May 30. Managers elected to replace the component and moved the launch of STS-111 to no earlier than June 4. Due to the uniqueness of the change-out and the work required to build a test fixture, launch of Endeavour was again postponed until June 5.

Landing: June 19, 2002 at 1:58:45 p.m. EDT

Runway 22, Edwards Air Force Base, Calif. Main gear touchdown: 1:57:41 p.m. EDT. Nose gear touchdown: 1:57:53 p.m. EDT. Wheel stop: 1:58:45 p.m. EDT. Rollout time: 1 minute, 4 seconds. Mission elapsed time: 13 days, 20 hours, 35 minutes, 56 seconds. Landed on orbit 217. Logged 5.8 million statute miles. Landed on the first of two California landing opportunities, after two days of

wave-offs at KSC due to weather concerns.

Endeavour was flown back to KSC June 29, 2002, atop a Boeing modified 747 aircraft.

Mission Highlights:

June 7, Mission Specialist Franklin Chang-Diaz equaled a space flight record with his seventh Shuttle flight, tying astronaut Jerry Ross. After docking with the ISS, linking to the Destiny Lab's forward docking port, the Endeavour and ISS crews transferred equipment, supplies and experiments.

The Expedition 4 crew – Yuri Onufriyenko, Daniel Bursch and Carl Walz -- unofficially ended their 182-day residence aboard ISS, and the Expedition 5 crew -- Commander Valery Korzun, Flight Engineer Peggy Whitson and Sergei Treschev – began their tenure.

June 8, using the Shuttle's robotic arm, Commander Kenneth Cockrell moved the Multi-Purpose Logistics Module Leonardo from Endeavour's payload bay to the Unity module. Transfer began of more than 5,600 pounds of cargo to the ISS.

Leonardo carried a total of 8,062 pounds of supplies and equipment to the Space Station, including a new science rack to house microgravity experiments and a glovebox that will allow Station crews to conduct experiments requiring isolation.

June 10, Whitson and Walz used the Canadarm2 to move the Mobile Remote Service Base System (MBS) from Endeavour to the Mobile Transporter on the Destiny Lab. The MBS, part of the Station's Mobile Servicing System, will allow the Canadarm2 to travel the length of the Station for construction tasks. The official change of command ceremony between the two Expedition crews followed.

June 12, the crews stowed 4,500 pounds of supplies and hardware in the Leonardo MPLM for return to Earth. Payload bay cameras captured views of the Colorado wildfires, visible from the 240-mile-high orbit of Endeavour/ISS.

Perrin returned the Leonardo MPLM to the Shuttle's payload bay June 14. The MPLM was filled with 4,667 pounds of equipment and supplies no longer needed on the Station.

June 15 Endeavour undocked from the ISS, flying one and a quarter laps around the Station before final separation.

Landing opportunities at Kennedy Space Center June 17-19 were waived due to low cloud cover, rain and thundershowers in the landing area.

EVA No. 1: 7 hours, 14 minutes

In their first ever spacewalk, Mission Specialists Franklin Chang-Diaz and Philippe Perrin installed a Power and Data Grapple Fixture to the Station's P6 truss. The fixture will be used to relocate the P6 truss to its final site on the Station. They retrieved

six micrometeoroid debris shields from Endeavour's cargo bay and temporarily stored them on PMA-1. They will ultimately be installed on the Zvezda Service Module. A newly added task required the two astronauts to inspect and photograph the failed control moment gyroscope on the Z1 truss. The photos may help ground controllers understand why the gyroscope failed. Next Chang-Diaz and Perrin removed thermal blankets from the MBS and positioned it above the Mobile Transporter to thermally condition it before mating it on EVA No. 2.

EVA No. 2: 5 hours

Chang-Diaz and Perrin connected primary and backup video and data cables and primary power cables between the Mobile Transporter rail car and the MBS. They deployed an auxiliary grapple fixture, the Payload Orbital Replacement Unit Accommodation (POA), on the MBS. The POA will be able to grapple payloads and hold them as they are moved along the Station's truss atop the MBS. The two astronauts secured four bolts to complete installation of the MBS platform. They also relocated a TV camera on top of the MBS to provide views of Station assembly and maintenance operations.

EVA No. 3: 7 hours, 17 minutes

Chang-Diaz and Perrin replaced the wrist-roll joint on Canadarm2, restoring it to full use. The faulty joint was secured in a flight support structure in Endeavour's cargo bay. Perrin removed the new joint from its launch carrier and brought it up to Chang-Diaz and the Canadarm2. The duo aligned the new component with the wrist yaw joint, tightened six bolts to secure the joint to the arm and turned the final bolt to connect power, data and video lines. After reinstalling the latching end effector, power to the arm was turned back on. The arm returned to full operational status at 4:43 p.m. EDT.

This was the 41st spacewalk supporting ISS assembly, bringing the total mission EVA time to 19 hours, 31 minutes.

STS-112

(9A/15th assembly flight to the ISS)

Atlantis Pad 39B

111th Shuttle mission
26th flight OV-104
60th KSC landing



Crew:

Jeffrey Ashby, Commander (3rd Shuttle flight)
Pamela Melroy, Pilot (2nd)
David Wolf, Mission Specialist, (3rd)
Piers Sellers, Mission Specialist, (1st)
Sandra Magnus, Mission Specialist (1st)
Fyodor Yurchikhin, Mission Specialist (1st)
(Russian Space Agency)

Orbiter Preps (move to):

OPF - April 19, 2002
VAB - Sept. 4, 2002
Pad 39B - Sept. 10, 2002

Launch: Oct. 7, 2002, at 3:45:51 p.m. EDT

The STS-112 mission was originally scheduled to launch Oct. 2; however, Hurricane Lili, in the Gulf of Mexico, threatened Mission Control at Johnson Space Center, Houston. Since the exact path was not determined until late in its forward movement, a decision was made to power down the JSC Mission Control Center and the launch was rescheduled for Oct. 7. Atlantis then lifted off on time to deliver the 28,000 pound Starboard 1 (S1) truss segment to the International Space Station.

A problem prevented the detonation of one of two sets of small explosives that release bolts that hold the Shuttle's solid rocket boosters to the launch platform and release ground connections to the external tank. A second redundant system fired normally and all pyrotechnic bolts were safely released.

Landing: Oct. 18, 2002, at 11:44:35 a.m. EDT

Main gear touchdown occurred at 11:43:40 a.m. EDT; nose gear touchdown at 11:43:48 a.m.; and wheel stop at 11:44:35 a.m. Mission elapsed time was 10:19:58:44. Logged 4.5 million statute miles. Rollout: 8,305 feet. This was the 60th landing at KSC in Shuttle program history.

Mission Highlights:

Primary payloads were the S1 integrated truss segment and the Crew and Equipment Translation Aid (CETA)

Cart A. The CETA is the first of two human-powered carts that will ride along the ISS railway, providing mobile work platforms for future spacewalking astronauts.

Activities included three spacewalks to attach the S1 truss to the Space Station. Magnus and ISS Science Officer Peggy Whitson lifted the 14-ton, 45-foot S1 truss from Atlantis' payload bay using the Station's Canadarm2. They then attached it to the Station with four remotely operated bolts.

Other chores were repairing the Station's exercise treadmill; adjusting protective circuits that measure current in the S1 truss radiator assembly to greater tolerance levels for space; removing and replacing a humidity separator in the Quest airlock.

Three spacewalks, totalling 19 hours, 41 minutes, accomplished the following:

EVA No. 1: 7 hours, 1 minute

Wolf and Sellers hooked up power, data and fluid lines, released locks on a beam allowing the S1 radiators to be oriented for optimal cooling, deployed an antenna, and released restraints on the CETA cart.

EVA No. 2: 6 hours, 4 minutes

Wolf and Sellers prepared CETA cart A for future use, installed 22 Spool Positioning Devices (SPD) on the Space Station ammonia-cooling line connections, installed an exterior TV camera outside Destiny, hooked up an ammonia supply for lines to the S1 radiator, and checked equipment to be used to install the next starboard truss. Two additional SPDs would not fit and were left unattached.

EVA No. 3: 6 hours, 36 minutes

After completing their first task, removing a bolt that prevented activation of a cable cutter on the mobile transporter, Wolf and Sellers then connected ammonia lines and removed structural support clamps that held the truss in place during launch. Working ahead of schedule, they then added a task -- installing SPDs on a pump motor assembly that helps circulate ammonia through the Station's cooling system. The Station's robotic arm, used as a work platform by the two spacewalkers, was operated by Whitson and Magnus.

Final activities on the Space Station included transferring the last of the equipment and supplies from Atlantis, and packing items for return on the orbiter. In all, 1,800 pounds were transferred and an equivalent amount stored for the journey back.

STS-113

(11A/16th ISS assembly flight)

Endeavour Pad 39A

112th Shuttle mission
19th flight OV-105
61st KSC landing



Crew:

James Wetherbee, Commander (6th Shuttle flight)
Paul Lockhart, Pilot (2nd)
Michael Lopez-Alegria, Mission Specialist, (3rd)
John Herrington, Mission Specialist, (1st)

Expedition 6 (up)
Ken Bowersox, Commander (5th)
Nikolai Budarin, flight engineer (2nd), RSA
Donald Pettit, flight engineer (1st)

Expedition 5 (down)
Valery Korzun, Commander, RSA
Peggy Whitson, Science Officer
Sergei Treschev, flight engineer, RSA

Orbiter Preps (move to):

OPF - June 29, 2002
VAB - Sept. 30, 2002
Pad 39A - Oct. 12, 2002

Launch: Nov. 23 at 7:49:47 p.m EST

The earlier planned launch on Nov. 11 was postponed when higher than allowable oxygen levels were detected in the orbiter's mid-body. Launch was tentatively set for no earlier than Nov. 18 so that technicians could troubleshoot and repair the leak. A fatigued flexible hose was found to be the cause and was replaced, along with another similar hose.

Another problem surfaced when a platform used to access the oxygen line bumped the robotic arm in the payload bay. Inspections of the arm for damage postponed launch until Nov. 22.

The launch was again postponed 24 hours to Nov. 23 due to poor weather conditions at Transoceanic Abort Landing sites.

Landing: Dec. 7, at 2:37 p.m. EST

After four days of landing attempts thwarted by bad weather, Endeavour and crew made a flawless landing on

the first of two opportunities on Runway 33 at the Shuttle Landing Facility, completing a 5.74-million-mile journey. The delays marked the first time landing has been waived off three consecutive days. Main gear touchdown was 2:37:12 p.m. EST, nose gear touchdown at 2:37:23 p.m., wheel stop at 2:38:25 p.m. Mission elapsed time was 13 days, 18 hours, 48 minutes, 38 seconds. Rollout distance averaged 10,563 feet.

Mission Highlights:

Over the course of the 14-day mission, the STS-113 crew and the Expedition Six crew combined to install the new P1 truss to the International Space Station, perform three spacewalks to outfit and activate the truss, and transfer supplies and equipment between the two spacecraft. Endeavour brought more than 2,500 pounds of material to the Station.

Among the transfer were science experiments, the PCG-STES and PGBA returning to Earth and the PCG-STES Unit 10 moving onto the Station.

While Endeavour was docked to the Space Station, Expedition 5 NASA Science Officer Peggy Whitson and Expedition 6 Commander Ken Bowersox replaced two valves and cleared debris from vent lines of the Carbon Dioxide Removal Assembly (CDRA) in the Station's U.S. Destiny Laboratory.

Prior to the first spacewalk, Commander Jim Wetherbee removed the P1 truss from Endeavour's payload bay, using the Shuttle's robotic arm, and handed it off to the Station's Canadarm2. Whitson and Bowersox maneuvered the P1 to its installation position.

EVA No. 1: 6 hours, 45 minutes.

Mission Specialists Michael Lopez-Alegria and John Herrington hooked up electrical connections between the P1 truss and Station, installed spool positioning devices that will ensure quick disconnect devices in fluid lines function properly, and released launch locks on the Crew and Equipment Translation Aid (CETA) cart. They also installed Node Wireless video system External Transceiver Assembly (WETA) antennas allowing reception from spacewalkers' helmet cameras without a Shuttle present.

EVA No. 2: 6 hours, 10 minutes.

On Thanksgiving Day, Lopez-Alegria and Herrington connected two fluid jumpers between the P1 and S0 trusses, linking plumbing for ammonia in the Station's cooling system. They removed the starboard keel pin, moving it to the proper location and stowing it in the P1 truss. They also installed a second WETA, this one on the P1 truss. They released launch locks on the P1 radiator beams.

Working from the Canadarm2, Herrington lifted the CETA cart to the S1 truss where he attached it to the tracks and secured it to its sister CETA, delivered on STS-112. The move cleared the P1 tracks so the Canadarm 2 can move on them via the Mobile Transporter and Mobile Base System.

A final task was reconnecting a cable on the WETA installed 2 days earlier.

EVA No. 3: 7 hours

Herrington and Lopez-Alegria successfully completed installation of 33 spool positioning devices around the outside of the Station.

Herrington also troubleshooted the stalled railcar (Mobile Transporter). He freed and deployed a UHF communications antenna that had snagged a trailing umbilical mechanism on the MT. The MT was able to reach its destination, Worksite 7. Herrington completed his assigned tasks without using the Canadarm2, which was to have transferred from the U.S. Lab to the MT to maneuver Herrington through some of his tasks.

During the mission, Whitson and Flight Engineer Donald Pettit did troubleshooting on the Microgravity Science Glovebox on the Station. The device, which provides electrical power to the facility, had failed Nov. 20. The MSG allows experiments with fluids, flame, particles or fumes to be performed in an enclosed environment. The box was returned to Earth for further study.



Space Shuttle Atlantis roars into the sky on mission STS-110 carrying the S0 Integrated Truss Structure and Mobile Transporter to the International Space Station.



Launch of Atlantis March 1, 2002, on mission STS-109 for repair of the Hubble Space Telescope.



Space Shuttle Endeavour lands on runway 15 at KSC's Shuttle Landing Facility atop a modified Boeing 747 Shuttle Carrier Aircraft. The cross-country ferry flight became necessary when three days of unfavorable weather conditions at KSC forced Endeavour to land at Dryden Flight Research Center, Edwards Air Force Base, Calif., on June 19 following mission STS-111.

**For more information on Shuttle missions, the following
Web sites are available:**

<http://www-pao.ksc.nasa.gov/kscpao/shuttle/summaries/chrontoc.htm>

<http://www-pao.ksc.nasa.gov/kscpao/status/stsstat/2002/months.htm>

<http://www-pao.ksc.nasa.gov/kscpao/status/stsstat/2001/months.htm>

<http://www-pao.ksc.nasa.gov/kscpao/nasafact/orbittoc.htm>

<http://www-pao.ksc.nasa.gov/kscpao/educate/docs.htm>



National Aeronautics and
Space Administration

John F. Kennedy Space Center
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