= Expedition 1 =

Expedition 1 was the first long @-@ duration stay on the International Space Station (ISS) . The three @-@ person crew stayed aboard the station for 136 days , from November 2000 to March 2001 . It was the beginning of an uninterrupted human presence on the station which continues as of July 2016 . Expedition 2 , which also had three crew members , immediately followed Expedition 1 .

The official start of the expedition occurred when the crew docked to the station on 2 November 2000 , aboard the Russian spacecraft Soyuz TM @-@ 31 , which had launched two days earlier . During their mission , the Expedition 1 crew activated various systems on board the station , unpacked equipment that had been delivered , and hosted three visiting Space Shuttle crews and two unmanned Russian Progress resupply vehicles . The crew was very busy throughout the mission , which was declared a success .

The three visiting Space Shuttles brought equipment , supplies , and key components of the space station . The first of these , STS @-@ 97 , docked in early December 2000 , and brought the first pair of large U.S. photovoltaic arrays , which increased the station 's power capabilities fivefold . The second visiting shuttle mission was STS @-@ 98 , which was docked in mid @-@ February 2001 , delivered the US $ 1 @.@ 4 billion research module Destiny , which increased the mass of the station beyond that of Mir for the first time . Mid @-@ March 2001 saw the final shuttle visit of the expedition , STS @-@ 102 , whose main purpose was to exchange the Expedition 1 crew with the next three @-@ person long @-@ duration crew , Expedition 2 . The expedition ended when Discovery undocked from the station on 18 March 2001 .

The Expedition 1 crew consisted of an American commander and two Russians . The commander , Bill Shepherd , had been in space three times before , all on shuttle missions which lasted at most a week . The Russians , Yuri Gidzenko and Sergei K. Krikalev , both had previous long @-@ duration spaceflights on Mir , with Krikalev having spent over a full year in space .

= = Crew = =

The commander , Bill Shepherd , was a former Navy SEAL , whose only spaceflights were on shuttle missions , and at the beginning of the mission his total time in space was about two weeks . Questions had been raised by the Russian space agency about the choice of Shepherd as mission commander due to his lack of experience . Flight engineer Sergei Krikalev had spent over a year in orbit , mostly on Mir , and would become the first person to visit the ISS twice . He had felt excitement to have been one of the first people to enter the Zarya module (the first component of the space station) in 1998 , during STS @-@ 88 , and was looking forward to returning . Yuri Gidzenko was designated commander and pilot of the two @-@ day Soyuz mission to the station , had one previous spaceflight , which was a 180 @-@ day stay aboard Mir .

Shepherd was only the second U.S. astronaut to be launched in a Russian spacecraft , the first being Norman Thagard , who launched on Soyuz TM @-@ 21 to visit Mir in 1995 . Shepherd expected one of the biggest challenges for the ISS would be the compatibility of technologies , such as that between Russian and U.S. technologies .

= = Backup Crew = =

= = Background = =

The first component of the space station was the Zarya module , which was launched unmanned in November 1998 . Following this launch , and prior to Expedition 1 , there were five manned Space Shuttle flights and two unmanned Russian flights to the ISS . Some of these flights delivered large modules , such as the pressurized Unity and Zvezda modules , and the first piece of the Integrated Truss Structure . The manned flights were used for partial assembly of the ISS , as well as to start

unpacking the supplies and equipment that were being delivered . Prior to Expedition 1 , Krikalev expected the ISS to be very similar to his experience on Mir ten years previous , due to the physical similarities of the stations ' components .

The launch of the Expedition 1 crew occurred a week before the United States presidential election , so it got little attention in the United States . At the time of the mission , the station was expected to be completed in 2006 , and be continuously inhabited until at least 2015 . Due to several delays , including the fallout from the Space Shuttle Columbia disaster , the station was completed in late 2011 , thanks to STS @-@ 134 .

= = Mission highlights = =

The crew of three were on board the International Space Station for four and a half months , from early November 2000 to mid @-@ March 2001 . Major events during this time include the three @-@ week @-@ long Space Shuttle visits , which occurred in early December , mid @-@ February , and at the end of the expedition in March .

= = = Launch and docking = = =

The three @-@ member Expedition 1 crew successfully launched on 31 October 2000 , at 07 : 52 UTC , atop a Soyuz @-@ U rocket on Soyuz TM @-@ 31 from the Baikonur Cosmodrome in Kazakhstan ; they used launch pad Gagarin 's Start , from which the first human to fly in space , Yuri Gagarin , was launched in 1961 . After 33 orbits of the Earth , and a series of rendezvous maneuvers performed by Gidzenko , they docked the Soyuz capsule to the aft port of the Zvezda Service Module on 2 November 2000 , at 09 : 21 UTC . Ninety minutes after docking , Shepherd opened the hatch to Zvezda and the crew members entered the complex .

Alpha

At the end of the first day on the station , Shepherd requested the use of the radio call sign " Alpha " , which he and Krikalev preferred it to the more cumbersome " International Space Station " . The name " Alpha " had previously been used for the station in the early 90 's , and following the request , its use was authorized for the whole of Expedition 1 . Shepherd had been advocating the use of a new name to project managers for some time . Referencing a naval tradition in a pre @-@ launch news conference he had said : " For thousands of years , humans have been going to sea in ships . People have designed and built these vessels , launched them with a good feeling that a name will bring good fortune to the crew and success to their voyage . " Yuri Semenov , the President of Russian Space Corporation Energia at the time , disapproved of the name " Alpha " ; he felt that Mir was the first space station , and so he would have preferred the names " Beta " or " Mir 2 " for the ISS .

= = = First month = = =

In their first weeks on board , the Expedition 1 crew members activated critical life support systems and computer control , as well as unpacked supplies left behind for them by previous supply missions . At this time the station did not have enough electricity to heat all three pressurized modules , so Unity was left unused and unheated . Unity had been used for the past two years to allow U.S. flight controllers to command ISS systems and read station system data .

The Russian unmanned resupply spacecraft Progress M1 @-@ 4 docked to the station on 18 November . The Progress spacecraft 's automatic docking system failed , necessitating a manual docking controlled by Gidzenko using the TORU docking system . Although manual dockings are routine , they have caused some concern among flight controllers since an attempt in 1997 which resulted in the spacecraft colliding with Mir , causing significant damage .

The astronauts had a heavy workload in the first month , as Shepherd told reporters in a space @-@ to @-@ ground interview : " To me , the biggest challenge is trying to pack 30 hours into an 18 @-@ hour work day . " Some of the early tasks took longer than scheduled . For example , the

activation of a food warmer in Zvezda 's galley was scheduled for 30 minutes , but it took the astronauts a day and a half to turn it on .

= = = STS @-@ 97 = = =

Endeavour docked with the ISS on 2 December 2000 , on mission STS @-@ 97 , bringing four more Americans and a Canadian temporarily to the station . The shuttle also brought the first pair of U.S. provided photovoltaic arrays , which would provide crucial electricity for further development of the station . In total , STS @-@ 97 brought 17 tons of equipment to the ISS , which also included expandable metal girders , batteries , electronics and cooling equipment .

Three spacewalks were conducted by the crew of STS @-@ 97 , all of which were completed prior to opening the hatch between shuttle and station . On 8 December , the hatch between the two was opened and the two crews greeted each other for the first time . It had remained closed to maintain their respective atmospheric pressures . The Expedition 1 crew took this opportunity to leave the station and tour the inside of the space shuttle , which was thought to be good for their psychological well @-@ being .

Progress M1 @-@ 4

Prior to Endeavour docking , the Russian resupply spacecraft Progress M1 @-@ 4 , which came to the station in mid @-@ November , was undocked to make room for the space shuttle . This Progress spacecraft remained undocked for the duration of STS @-@ 97 , parked in orbit about a mile away from the station . It docked manually again with the station on 26 December by Gidzenko , after Endeavour left . The automatic docking system for this Progress spacecraft had failed on the first docking in November . The crew spent much of the following week unloading the Progress spacecraft .

Christmas and New Year

On Christmas Day , the Expedition 1 crew were given the day off work . They opened presents delivered by Endeavour and the Progress supply ship . They also each took turns speaking to their families . In the following days they did several video downlinks , some with Russian TV stations . The crew had a quiet New Year . Citing a Naval tradition , for the New Year 's entry of the station 's log , Shepherd provided a poem on behalf of the crew .

= = = STS @-@ 98 = = =

On 9 February 2001 , Space Shuttle Atlantis docked to the ISS , bringing the five American crew members of STS @-@ 98 temporarily to the station . The mission was originally planned for mid @-@ January , but was delayed due to NASA 's concerns about some cables on the shuttles . This mission brought the U.S. built Destiny laboratory , which has a mass of 16 short tons . It was installed with the use of the shuttle 's robotic Canadarm , controlled by Marsha Ivins . Astronauts Thomas D. Jones and Robert L. Curbeam helped with the installation during a spacewalk . The Destiny module had a cost of US $ 1 @.@ 4 billion , and would be used primarily for scientific research . During the spacewalk an ammonia coolant leak created a contamination scare , which happened when Curbean was hooking up coolant lines to Destiny . The other two spacewalks went ahead without any problems . While the Shuttle was docked , the control of the station 's orientation was switched from propellants to electrically powered gyroscopes , which had been installed in September 2000 . The gyroscopes had not been used earlier due to the lack of key navigational electronics .

By the end of STS @-@ 98 , the crew of Expedition 1 had been on the station for over three months , and Shepherd stated that he was " ready to come home " . NASA used several techniques to prevent the three crew members from suffering the effects of the " three @-@ month wall " psychological barrier , which had caused depression in previous astronauts . For example , they allowed more time for the crew to speak to their families via videophone , and they also encouraged them to watch movies and listen to music they like .

Progress M @-@ 44

On 28 February the third Progress spacecraft to visit the ISS , Progress M @-@ 44 , docked to the Zvezda module . It brought air , food , rocket fuel and other equipment . It remained docked until Expedition 2 , when it was intentionally burnt up during atmospheric reentry , like all Progress spacecraft .

= = = STS @-@ 102 = = =

Space Shuttle Discovery docked on 10 March 2001 , bringing to the ISS the new long @-@ duration three @-@ person crew of Expedition 2 , as well as four short @-@ term crew members of STS @-@ 102 . A few hours after docking , the hatch opened , and all ten astronauts greeted each other , setting a new record for the number people simultaneously in the ISS . The day after docking , American astronauts Jim Voss and Susan Helms began a spacewalk which ended up being nearly nine hours long , and still holds the record for the longest spacewalk ever performed , as of August 2010 . The length of the spacewalk was partially due to some mistakes , including Voss accidentally releasing a small tool . Unable to retrieve it , NASA engineers tracked the tool , and decided to use Discovery 's thrusters on 14 March to boost the station four kilometers higher , to ensure the ISS would not collide with the piece of space debris .

Transferring expedition crews

By 14 March , the expedition crews had completed the change over , but until the shuttle undocked , Shepherd officially remained commander of the station . The morning of the 14th the astronauts ' wake @-@ up call was the song " Should I Stay or Should I Go " by The Clash , at the request of Shepherd 's wife . Shepherd , a former Navy SEAL , said during the change over ceremony : " May the good will , spirit and sense of mission we had enjoyed on board endure . Sail her well . " The commander of Discovery , Jim Wetherbee , said " " For Captain Shepherd and his crew , we hold you in admiration as we prepare to bring you home . This has been an arduous duty for you . This ship was not built in a safe harbor . It was built on the high seas . "

= = = Undocking and landing = = =

The crew 's four and a half @-@ month tour aboard the ISS officially ended on 18 March 2001 , when Discovery undocked . The Expedition 1 crew returned home to Earth on STS @-@ 102 , landing on 21 March 2001 , on a rare night landing at 2 : 30 am local time . Two days after the landing , coincidentally , Mir was intentionally burned up during atmospheric reentry , ending its 15 years in orbit .

= = Daily activities = =

In a typical day , each crew member divided his time between physical exercise , station assembly and maintenance , experiments , communications with ground personnel , personal time , and bio @-@ needs activities (such as rest and eating) . The crew 's daily schedule usually operated on UTC ; for example , a typical morning had been scheduled to begin with an electronic wake @-@ up tone at about 05 : 00 UTC . But during the expedition , a more typical wake @-@ up time was actually between 06 : 00 and 07 : 00 UTC . The crew 's sleep habits were sometimes shifted to accommodate the schedules of visiting shuttles or resupply vehicles .

Following the wake @-@ up call , the crew was given some time to clean up , have breakfast , and read e @-@ mail which had been uplinked to them from flight controllers . Their work day included a lunch break at midday (UTC) , and ended with a mid @-@ afternoon planning session with flight controllers , regarding the next day 's activities . Most days ended with some entertainment , with the crew watching all or part of a movie ; this was thought to be good for crew bonding as well as their psychological well @-@ being . After watching 2010 , the sequel to 2001 : A Space Odyssey (film) , Shepherd commented , " [There is] something strange about watching a movie about a space expedition when you 're actually on a space expedition " .

An important part of the crew 's schedule was regular exercise . They had three pieces of

equipment for this : a stationary bicycle , a treadmill (TVIS) , and a resistance device (IRED) for weight @-@ lifting . The bicycle malfunctioned in mid @-@ December 2000 , and wasn 't fixed until March . The treadmill , which used bungee cords to keep the crew member in place , was designed to reduce the vibrations caused by running . A normal treadmill would have produced enough vibrations to shake the station , and potentially affect the sensitive science experiments on board . The treadmill malfunctioned near the end of February , but some in @-@ flight maintenance fixed the problem within a week .

= = = Ground communications = = =

Until the Unity module was available for use a month into the mission , the astronauts used the Russian VHF communications gear (also called the " Regul radio link ") in Zvezda and the Zarya module to communicate with the Russian Mission Control Center (known as " TsUP ") in Korolev , outside Moscow . The Russian technology didn 't have the use of satellites , so they were restricted to ground passes (called a " comm pass ") which lasted for only 10 ? 20 minutes . With the arrival of the solar arrays on STS @-@ 97 , they activated the S @-@ band Early Communication gear in the Unity Module , allowing for more continuous communication with Mission Control in Houston via NASA 's network of Tracking and Data Relay Satellites .

During STS @-@ 106 in September 2000 , the equipment for a ham radio was delivered to the station . The first ' ham ' contact with the ground by the Expedition 1 crew was on 13 November 2000 on a pass over Moscow , shortly followed by contact with Goddard Space Flight Center in Greenbelt , Maryland . The crew reported that " Voice quality of ham radio continues to be well above any of our other links . "

The Amateur Radio on the International Space Station project had the crew of the station to make brief windows to radio contact with schools and clubs on the ground . The first school to be contacted by the ISS was Luther Burbank School in southwest Chicago . The contact had been planned for 19 December 2000 , but due to technical problems , it was delayed to 21 December 2000 . Due to the speed of the space station , the window of radio contact only lasted for 5 ? 10 minutes , which was usually enough for 10 to 20 questions .

= = = Science activities = = =

Unlike subsequent expeditions , the crew of Expedition 1 had a somewhat modest amount of science experiments to conduct , due to the priority placed on station construction . The plasma crystal experiment , known as PKE @-@ Nefedov , was one of the first natural science experiments conducted on the space station . It was a collaboration between the Max Planck Institute for Extraterrestrial Physics in Germany , and the Institute for High Energy Densities (part of the Russian Academy of Sciences) .

Like previous missions , the astronauts took many photos of Earth from the station , over 700 in total , which have been made freely available . These Crew Earth Observations , are intended to record dynamic events on the Earth 's surface such as storms , fires , or volcanoes . For example , a photo from 1 January 2001 shows Mount Cleveland , Alaska , with a plume of smoke , prior to its eruption the following month . On 23 January 2001 , the crew observed a unique perspective of a plume of volcanic ash coming from Popocatépetl , an active volcano 70 kilometres southeast of Mexico City .

An example of a low @-@ maintenance experiment was the protein crystal growth experiment , which had also been flown on previous shuttle missions . The goal was to produce better protein crystallizations than those produced on the Earth , and hence allowing for a more accurate model of protein structures . Of the 23 proteins and viruses attempted during Expedition 1 , only four resulted in successful crystallizations , which was a lower success rate than predicted . Of those successful was the low @-@ calorie sweetener Thaumatin , whose crystals diffracted at a higher resolution than Earth @-@ grown crystal , which resulted in a more accurate protein structure model .

Another research activity was measuring the crew 's heart rates and the station 's carbon dioxide

levels to determine the effect of exercise on the station .

= = = IMAX filming = = =

Throughout the mission the Expedition 1 crew filmed footage for use in the IMAX documentary film , Space Station 3D . Highlights of the footage include the first entry into the Destiny module , during STS @-@ 98 ; the Expedition 1 crew showering and shaving in zero gravity ; and the docking of STS @-@ 102 , followed by the change over to the Expedition 2 crew .

= = = NASA = = =