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Spaceport News

America's gateway to the universe. Leading the world in preparing and launching missions to Earth and beyond.

John F. Kennedy Space Center

Fortieth Anniversary
Pioneering the Future

Next to Mars...

Space artist David Seal's depiction of Mars and the next pair of spacecraft to explore its atmosphere and icy southern pole was selected as the project insignia for NASA's 1998 Mars Climate Orbiter and Mars Polar Lander missions.

On opposite corners of this triangular decal are the next-generation Mars orbiter and the polar lander, scheduled to launch from Cape Canaveral Air Station in December 1998 and early January 1999 respectively.

...and then to the stars

Scheduled to launch Feb. 6, 1999, the Stardust spacecraft will be the first U.S. mission dedicated to exploring a comet. In 2004, the spacecraft will perform a flyby of the comet Wild-2, 60 miles from the comet's nucleus. Cometary dust will be captured and returned to Earth for detailed analysis in 2006. Stardust is the first mission selected for return of material from outside the orbit of the moon.

STS-88: The first U.S. launch for the ISS

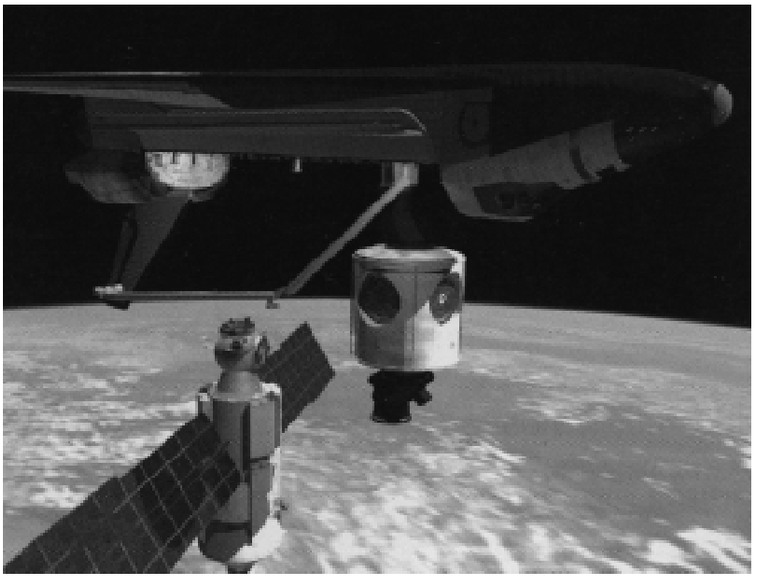
The greatest adventure in space begins

Zarya meets Unity, and so begins construction of the largest international peacetime scientific program in history.

The launch of STS-88 on Dec. 3 at 3:59 a.m. from KSC's Launch Pad 39A will be the first U.S. launch for the International Space Station (ISS). The Space Shuttle Endeavour will carry in its payload bay the first major U.S.-built component of the ISS — the Unity connecting module.

During the planned nearly 12-day mission, Unity will be mated with the already orbiting Zarya control module. At press time, the launch of Zarya was scheduled for Nov. 20 aboard a Russian Proton rocket from Baikonur in Kazakhstan.

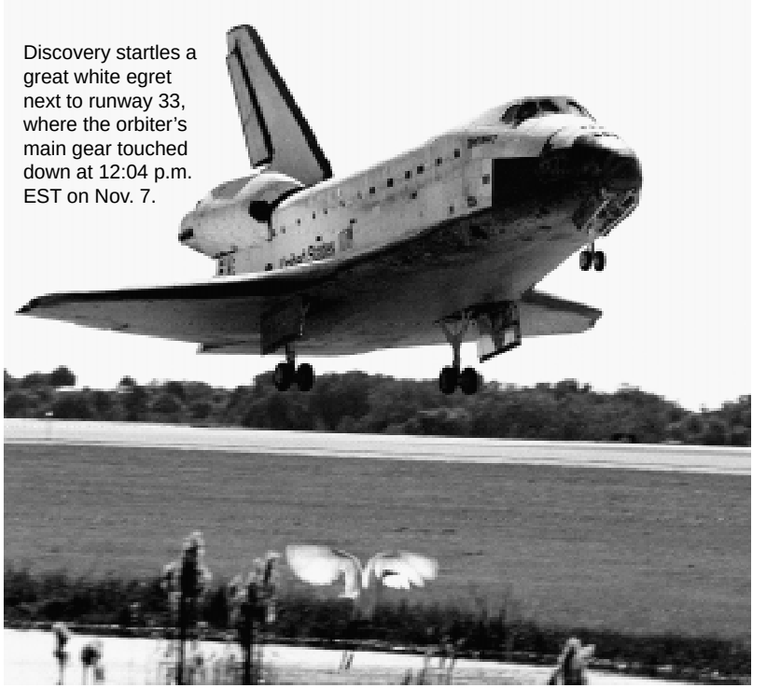
(See STS-88, Page 4)



The first International Space Station assembly flight will be highlighted by the mating of the Russian-built Zarya, seen at the bottom left of this artist's rendering, to the U.S.-built Unity connecting module, immediately below Endeavour's payload bay, by use of the orbiter's mechanical arm.

The launch and landing of STS-95:

one American legend, six astronaut heros, and hundreds of KSC stars



Discovery startles a great white egret next to runway 33, where the orbiter's main gear touched down at 12:04 p.m. EST on Nov. 7.

Behind the scenes, far from the madding crowds of media, celebrities, VIPs, special guests and tourists at the launch of STS-95 on Oct. 29, were many dedicated individuals who worked day and night at Kennedy Space Center to make it all happen.

"It wasn't any small group of people who made the launch and landing of STS-95 a success," said KSC Director of Installation Operations Marv Jones. "There are over 12,000 of us working here, and I felt like 12,000 people were rowing the boat in the same direction at the same time."

Jones' directorate was responsible for orchestrating the smooth and safe handling of traffic demands on the center before and

(See KSC Team, Page 2)

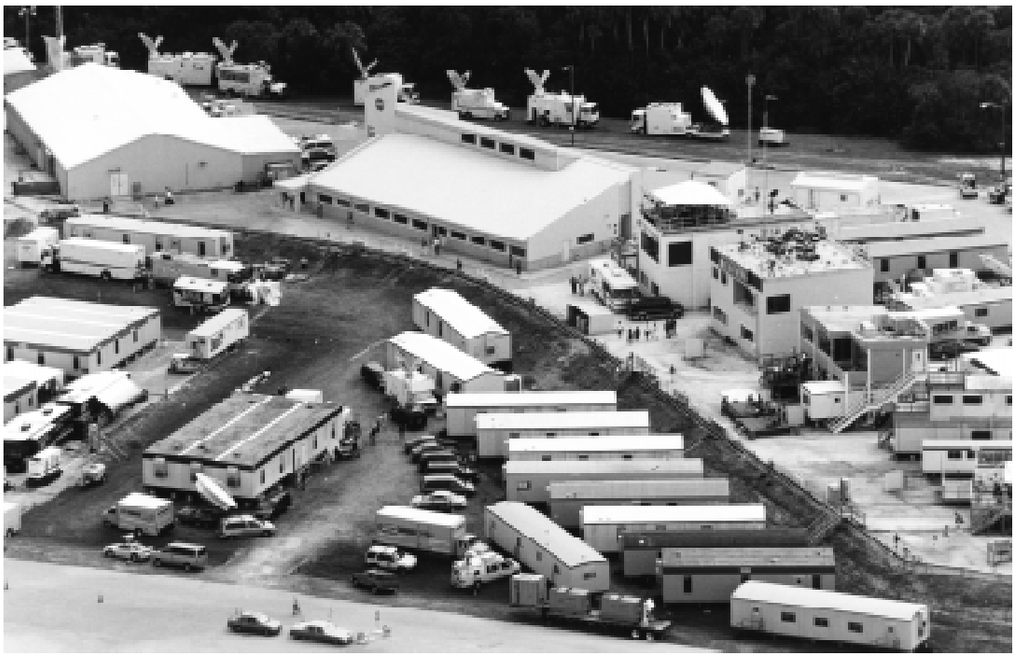
KSC Team ...

(Continued from Page 1)

after launch; increased demands on phone lines, including cellular phone traffic; transportation for an increased number of visitors and media; preparations for heightened security; and extraordinary requirements for power demanded by an unprecedented presidential visit and number of media in attendance. "Many of these extra requirements became the responsibility of our new J-BOSC contractor, SGS, who performed admirably," Jones noted.

"With the president's visit, we had a significant increase in the communications requirements to support him and his staff," he continued. "We had an awful lot of work to do in a very short period of time. At Complex H, behind the press site, we set up 80 telephone lines the day before the launch just for White House press corps." That was a cooperative effort, Jones pointed out, between Spacemark, our telecommunications contractor, and USA.

Cellular phone requirements also increased to support the wave of activity, with both Bell-South and AT&T bringing in portable cellular phone towers (in addition to the one cellular phone tower already at KSC) and increasing their capacity.



The grassy slope below KSC's Press Site was teeming with trailers brought in to house the media representatives at the center covering the launch of STS-95.To accommodate the nearly 3,000 media who covered the event, 40 trailers, 75 trucks and recreational vehicles, eight stages and eight risers were provided. Sparking the media frenzy was the return to space of John Glenn Jr., the first American to orbit the Earth 37 years ago.

Guest operations flawless

"We essentially quadrupled the capability of the cell phone systems across the center on launch day to handle the increased demand," Jones said. "I would guess that probably of the 3,000 or so media at the press site, probably 75 percent of them had cell phones — and that doesn't include the visitors who brought theirs as well."

Visitors at the Banana Creek viewing site were treated to new facilities for this launch, thanks to extra funding from NASA Headquarters to increase the capacity of the site for STS-95 and future launches. The Banana Creek site received more parking spaces, paved walking areas, more bleachers and concession stands, and a new permanent restroom facility. This helped to nearly double the capacity of the viewing site from about 2,000 visitors to 4,000.

"The comments I heard regarding guest operations were that they were absolutely flawless," remarked Jones.

Center Director Roy Bridges also expressed his own personal thanks to the KSC team and relayed the gratitude from NASA Headquarters.

Bridges noted that NASA Associate Administrator for Space Flight Joseph Rothenberg asked him to pass along his "congratulations to the entire team at KSC for successfully hosting the nation and the world while demonstrating what the Shuttle is capable of doing."

NASA Acting Deputing Administrator John "Jack" Dailey also was at KSC during the launch. "Dailey said that he has received high praise from other members of the President's Management Council who attended the STS-95 launch about the 'great enthusiasm and technical skills' demonstrated by the Kennedy workforce," Bridges noted.

"You made it look effortless," Dailey told managers in the Mission Briefing Room, "and no one else could have pulled off such a feat."

"Only the KSC team," added Bridges, "has the necessary spirit to pull off something this big and do it so well."

Launch team remained focused

Part of doing it well meant insulating the launch team — whose responsibilities include assuring that all Shuttle and ground support systems are ready for launch — so they could focus on their activities without distraction.

After each liftoff, the launch director recognizes a member of the KSC launch team whose organization far exceeded their duties in order to allow the launch to safely proceed.

"We asked the KSC Public Affairs Office to hang the mission plaque in the firing room at the Launch Control Center," said STS-95 Launch Director Ralph Roe. "They did a great job deflecting all of the media and visitor activities during the countdown from the core members of the launch team."

Roe compared the situation to a basketball player shooting a foul shot with 50,000 screaming fans around him. "He doesn't hear the shouting fans," Roe said. "He's able to focus on making the shot, and I think our team has that same kind of focus and intensity. No matter what's going on around them, they're able to focus on the job at hand."

In addition to the Public Affairs Office, Roe praised the direction of center management and the efforts of countless individuals across the board, both NASA and contractor, who helped the Shuttle Processing Directorate.

"The launch team really appreciates the efforts of folks who aren't directly related with launch, yet really did an outstanding job of dealing with all the extracurricular activities that were going on," noted Roe.

Jones added that many KSC workers volunteered to help where needed. That included driving vehicles to pick up special guests and VIPs and escort them to various locations in and around Kennedy Space Center.

Heightened security needs

An increased number of visitors, especially VIPs, meant a heightened level of security.

"If you look around the world at what was going on that day — we had the president here, we had more than 70 members of Congress, including state legislators and governors, plus numerous movie stars, so as far as being a target for anything to happen, this was the target on that day," Cal Burch, chief of KSC Protective Services pointed out.

"We had the support of NASA Administrator Dan Goldin and KSC Director Roy Bridges, who recognized the situation we were in and accepted the inconvenience that some guests and employees might have due to heightened security measures in place," he said.

Both KSC and Cape Canaveral Air Station managers allowed, where possible, employees the flexibility to take administrative leave or flexitime to accommodate traffic conditions on

launch day.

But despite the overwhelming crowds and demands on Protective Services during launch week, there were no security violations or traffic accidents reported to them, nor complaints from KSC employees or guests.

"I just attribute that to everyone doing his or her job at KSC," noted Burch. "If we had the opportunity to say one thing to the KSC population at large here, it would be just 'thank you' for understanding the need for increased security and for their cooperation. There were no complaints about extra badge checks or vehicle checks. We had the full cooperation across the board from the KSC staff."

While county, state and federal agencies are always involved in Shuttle launches to some extent, the degree of involvement was greatly increased for STS-95.

An estimated 350,000 people visited the Space Coast for the launch of STS-95.

"Police departments and the sheriff's office for Brevard County and other law enforcement agencies from all over the state contributed to security here for traffic assistance, escorts, intelligence and canine services," added Mike Stevens, program manager for KSC criminal investigations and the Protective Services lead for STS-95.

The Emergency Management Office in Rockledge provided pre-launch parking, traffic and health-related information to the public and also provided aid and rest stations on county roads in the event of a traffic jam or need for medical assistance during the launch. State organizations — such as the Florida Highway Patrol, Department of Law Enforcement, and Marine Patrol — provided additional staffing.

The Florida Highway Patrol, for example, brought an additional 25 officers from outside the county to help with local traffic control.

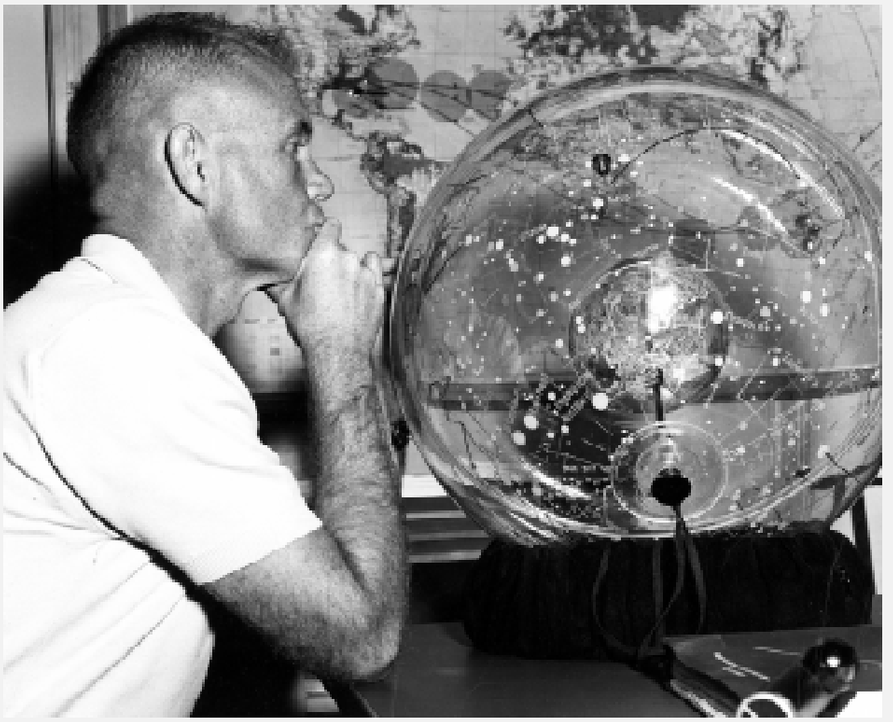
Federal agencies also provided assistance. Through the U.S. Customs Service, additional dogs for drug and bomb searches were provided from law enforcement agencies on Florida's west coast.

KSC spirit highly visible

"You have to remember that everybody's a volunteer who works here; none of us is drafted," said Jones. "We're here because we want to be here. We were trying to show that we really know what we're doing — whether it be launch-specific or support activities, it was an opportunity for all of us to show that we know what we're doing in America's space program."

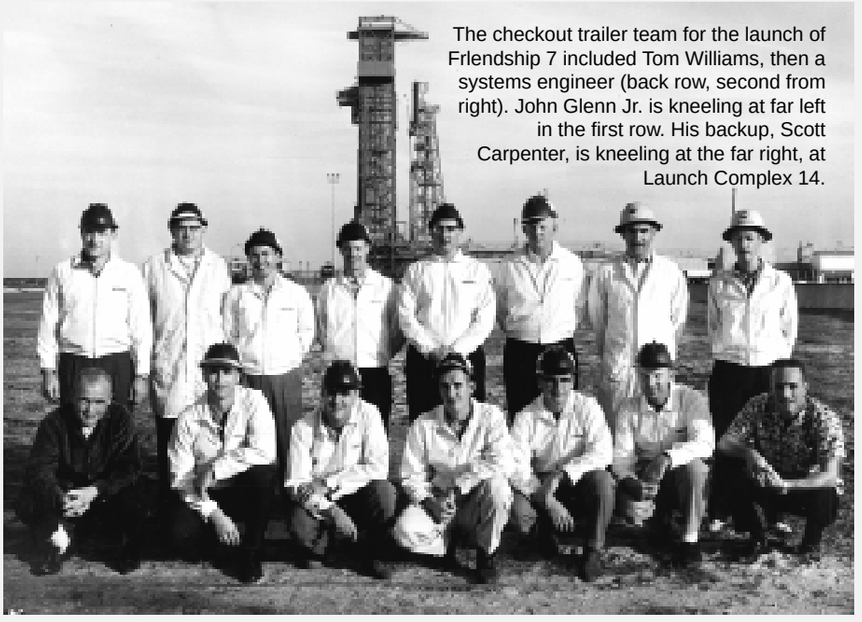
"I was proud," Bridges added, "of everyone's willingness to go the extra miles needed to make STS-95 a huge success. Many eyes were watching us on Oct. 29. Even the President and First Lady of the United States recognized the KSC team for their ability to launch legends and heroes time and again. You are truly the inspiration that keeps America's dream alive."

Remembering moments from Glenn's first trip in orbit



Then Col. John Glenn Jr. ponders a global orbital flight map in this photo from Williams' collection.

NASA Electrical and Telecommunications Division Chief Tom Williams recalls the excitement of "the Glenn launch" a little differently than most. For Williams, a NASA systems engineer for the launch of Friendship 7 in 1962, he remembers tense moments not just during liftoff, but especially during the mission. "We got a telemetry indication that the landing bag under the heat shield had become unlocked prematurely, and the spacecraft would not survive a re-entry if the bag were released that early during flight," Williams said. "We had to make some quick decisions then. We decided to leave the protective retropack covering the heat shield in place rather than jettisoning the retrorockets after Glenn fired them in order to provide an added measure of insurance securing the landing bag until needed." Williams, the team in Hangar S and the Mission Control team all agreed, and the plan worked. The heat shield did not drop during re-entry, and the landing bag was protected. The retropack fitting and straps burned off during the heat of re-entry, and later the telemetry indication proved to be erroneous.



The checkout trailer team for the launch of Frlendship 7 included Tom Williams, then a systems engineer (back row, second from right). John Glenn Jr. is kneeling at far left in the first row. His backup, Scott Carpenter, is kneeling at the far right, at Launch Complex 14.

STS-88 ...

(Continued from Page 1)

The 21-ton orbiting Zarya (Russian word for 'sunrise'), a U.S.- funded and Russian-built component, will provide propulsive control capability and power for the ISS during the early stages of station assembly and later will be used for fuel storage.

The orbiter's rendezvous with Zarya actually begins with the precisely timed launch of Endeavour. Periodically during the 48 hours following launch, a series of rendezvous maneuvers will be performed by Commander Robert Cabana and Pilot Frederick "Rick" Sturckow to slowly close in on the orbiting Zarya.

A day before the final rendezvous with Zarya, Mission Specialist Nancy Currie will use Endeavour's 50-foot-long robotic arm to lift Unity from its berth in the aft cargo bay and securely latch it atop the Orbiter Docking System in the forward portion of the bay.

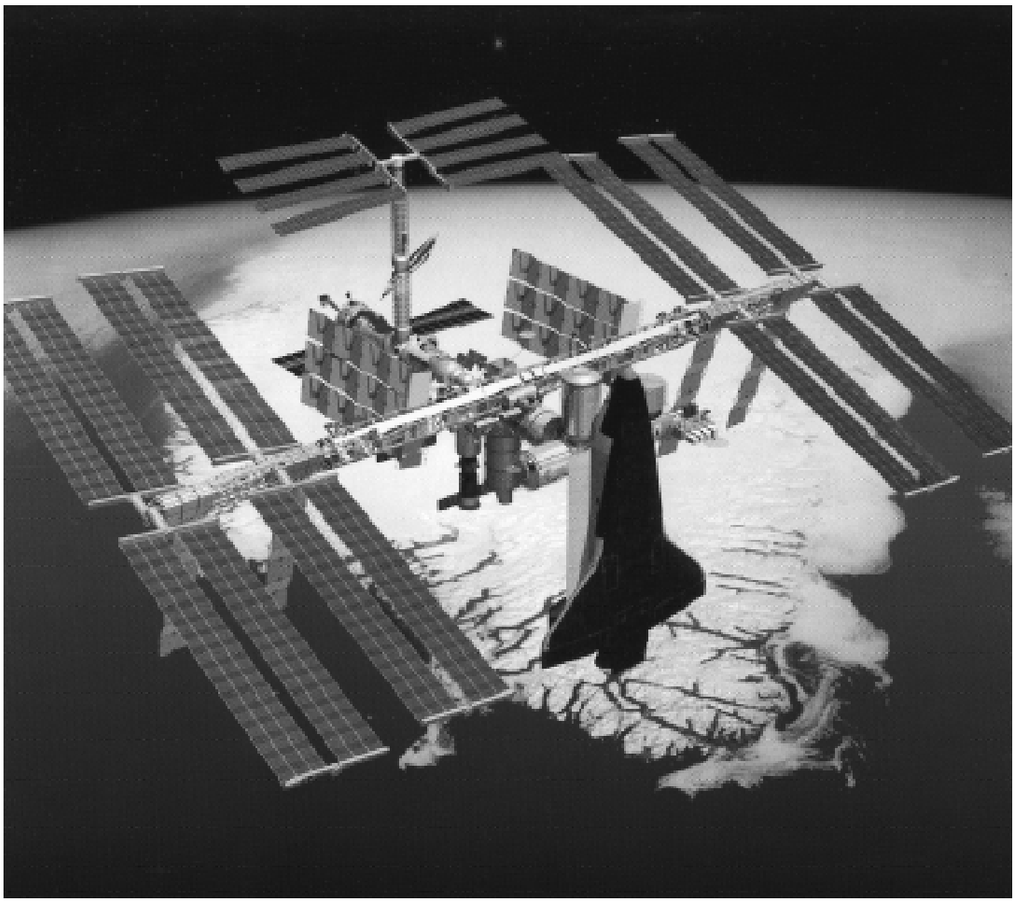
The final approach to Zarya will be flown manually by Cabana, moving straight up underneath Zarya along an imaginary 'R-Bar,' or radius vector. This approach will be similiar to approaches flown by the Shuttle when it docked with the Russian Space Station Mir during Phase One of the ISS Program.

As the orbiter closes in on Zarya, Currie will maneuver the robotic arm to a position above the payload bay, in place to latch onto Zarya. Cabana will complete the rendezvous by placing the edge of Endeavour's payload bay within about 10 feet of Zarya, allowing Currie to capture it with the arm and dock it to one of Unity's two Pressurized Mating Adapters.

Pressurized Mating Adapter-1 (PMA-1) will connect Unity with Zarya, while PMA-2 provides an orbiter docking location.

Because the view of Zarya from the crew cabin windows will be blocked by Unity, the final minutes of the rendezvous and capture will be conducted by the crew using only television monitors and the assistance of the Orbiter Space Vision System, an optical alignment aid that has been extensively tested on Shuttle flights leading up to STS-88.

Equipment developed for the International Space Station is already paying dividends on the ground. Scientists are growing ovarian tumor samples in NASA's new cell-culturing device so tumors can be studied outside the body, without harm to the patient. A similar trial is underway for brain tumors.



The ISS will afford scientists, engineers, and entrepreneurs an unprecedented platform on which to perform complex, long-duration and replicable experiments in the unique microgravity environment of space. Yet the ISS is much more than just a world-class laboratory in an above-the-world environment; it is an international human experiment — a place where we will learn how to live and work "off planet" with our international partners.

The alignment system uses the orbiter's closed circuit television system's view of special markings on Zarya to create a precise maneuvering aid for the crew when a direct line of sight is unavailable.

The multi-port, 18-foot-long and 15-foot-diameter Unity will be the main connecting point for later U.S. station modules and components. Fabricated of aluminum, Unity contains more than 50,000 mechanical items, 216 lines to carry fluids and gases, and 121 internal and external electrical cables using six miles of wire.

Eventually, Unity's six ports will provide connecting points for the Z1 truss exterior framework; U.S. laboratory; airlock; cupola; Node 3; and the MultiPurpose Logistics Module, as well as Zarya.

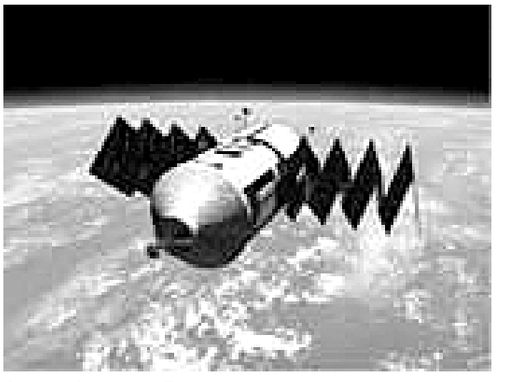
After the docking of Unity with Zarya, STS-88 Mission Specialists Jerry Ross and Jim Newman will perform three spacewalks to bolt together the first two pieces of the International Space Station. (Ross is a veteran of 23 hours' spacewalking on four previous extravehicular activities, or EVAs; Newman has made one spacewalk in his two previous space flights.)

One six-hour spacewalk will be carried out every other day with the first occurring the day after Zarya rendezvous and mating.

The entire International Space Station assembly sequence of more than 40 launches over five years will require dozens of spacewalks.

"I think it will catch the public's eye," said International Space Station Program Manager Randy Brinkley in a recent interview. "The public interest on the first Hubble servicing mission, when we had to do some very complex EVA spacewalks in order to repair the Hubble, the public became very, very interested in those activities. ...

"I think the same will be the case for the International Space Station because we will have a tremendous number of spacewalks required to assemble it," he added. "Rather than independent events, it will be an ongoing saga that will last some five years, which represents the most complex technological and engineering



An artist's view of Zarya deploying its solar panels.

challenge that's been undertaken to date."

The first STS-88 spacewalk will consist primarily of attaching umbilicals and connectors between the PMAs, Unity and Zarya.

Command checks between Mission Control in Houston and in Moscow will be conducted the next day. The ground control checks will include verifying command capability to Zarya from Houston via the control center outside of Moscow. PMA-1 will be pressurized via Zarya and an initial leak check will be carried out.

On the second spacewalk, Ross and Newman will install handrails and worksite interfaces as well as remove hatch and petal launch restraints from both the left and top berthing mechanisms on Unity. The two astronauts also will install S-band early communications system antennas.

On the day before the final scheduled spacewalk, the crew will enter Unity, the mating adapters and Zarya through the orbiter's docking mechanism for the first time. Once inside, portable fans and lights will be installed along with components of the S-band early communications system.

The third and final spacewalk will begin with the astronauts disconnecting jumper cables and installing connectors. In addition, tool boxes will be stowed on the outside of Unity to wait for the arrival and use of future assembly crews.

The day following the spacewalks, Endeavour will undock from the two components, completing the first ISS assembly mission.

And when the ISS itself is completed, it will have a mass of up to one million pounds with a pressurized living space roughly equivalent to the passenger cabin volume of two 747 jetliners.

International Space Station assembly sequence

Date	Launch Vehicle	Element/s
11/20/98	Russian Proton	Zarya
12/03/98	STS-88 (Endeavour)	Unity
05/13/99	STS-96 (Discovery)	Spacehab Double Cargo Module
07/99	Russian Proton	Service Module
08/05/99	STS-101 (Atlantis)	Spacehab Double Cargo Module
10/28/99	STS-92 (Discovery)	Integrated Truss Structure; PMA-3; Ku-band
12/02/99	STS-97 (Atlantis)	Integrated Truss Structure P6
01/00	Russian Soyuz	1st ISS crew
02/00	STS-98 (Endeavour)	US Lab Module
03/00	STS-102	Logistics and resupply
04/00	STS-100	Leonardo MPLM
07/00	STS-104	Joint air-lock high pressure gas assembly

In this bird's-eye view photograph, the STS-88 crew gather near the top of the Fixed Service Structure at Launch Pad 39A on Nov. 4. They are, left to right, Mission Commander Robert Cabana, Mission Specialist Nancy Currie, Pilot Frederick "Rick" Sturckow, Mission Specialists Jerry Ross, James Newman and Sergei Krikalev, a Russian cosmonaut. The crew were at KSC to participate in the Terminal Countdown Demonstration Test, a dress rehearsal for launch. STS-88, scheduled for launch Dec. 3, is the first U.S. flight for the assembly of the International Space Station and will carry the Unity connecting module.

NASA selects Maryland firm to provide information technology services for four NASA field centers

NASA has selected OAO Corporation of Greenbelt, Md., to provide information technology services for the four Office of Space Flight centers under the Outsourcing Desktop Initiative for NASA (ODIN).

The services will be ordered under the existing ODIN master contract, which is administered by the ODIN Program Office at NASA's Goddard Space Flight Center in Maryland. They include comprehensive desktop computer, server, local area network, telephone, local video, administrative radio, remote communication and public address services.

Kennedy Space Center is the lead service center for the Office of Space Flight ODIN delivery orders, which covers the four NASA centers. Besides KSC, they are Johnson Space Center; Marshall Space Flight Center; and Stennis Space Center in Mississippi.

There will be four firm fixed-priced delivery orders, one for each space flight center.

The period of performance is approximately three years beginning on Dec. 1, 1998, at KSC; Jan. 1, 1999, at JSC; Feb. 1, 1999, at SSC; and May 1, 1999, at MSFC. Each of the delivery orders will expire concurrently on Nov. 30, 2001.

The total value for the four delivery orders is estimated at $154.9 million.

Six other firms are part of the pool of contractors.

They are Boeing Information Services Inc., Vienna, Va.; Computer Sciences Corporation, Laurel, Md.; DynCorp TECHSERV, LLC, Reston, Va.; FDC Technologies, Bethesda, Md.; RMS Information Systems Inc., Lanham, Md.; and Wang Government Systems Inc., McLean, Va.

For additional information, call Maury Sweetin at 267-5970 or Jeanne O'Bryan at 867-4686.

AIDS information focus of November KSC Health Education and Wellness Program

Since 1981, more than 600,000 Americans have been diagnosed with AIDS and at least 385,000 have died. The first ever declines in AIDS incidences and deaths occurred in 1996, with drops of seven percent and 25 percent, respectively. These dramatic decreases in AIDS cases and deaths are largely due to successful drug treatment programs.

Despite the fact that AIDS incidences are down across the United States, the number of people living with HIV infections is rising.

Estimates suggest that between 650,000 and 900,000 are now living with HIV and at least 40,000 become newly infected each year. In the United States, women now account for 16 percent of all AIDS cases.

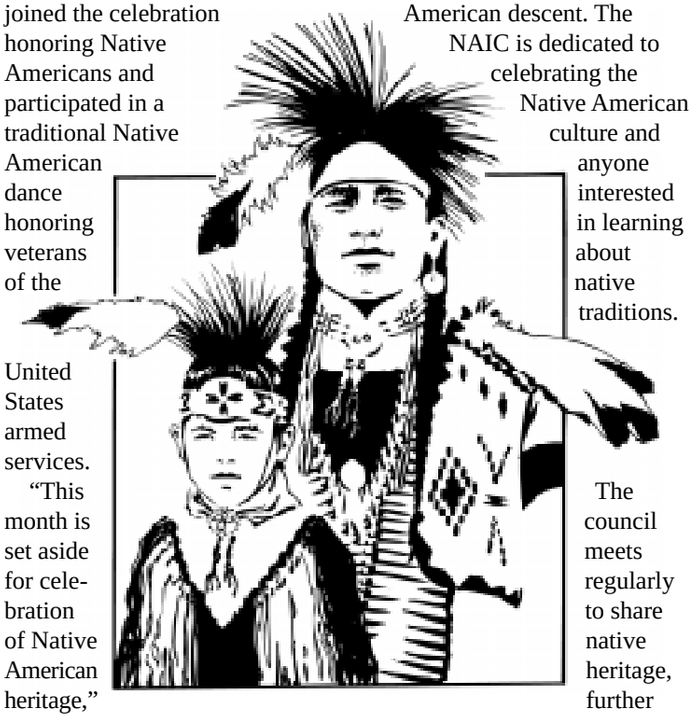
At this time, there is no vaccine, and AIDS cannot be cured. It can, however, be prevented. A packet of the latest information and statistics is available throughout the month of November through KSC's Health Education and Wellness Program. Packets and lectures on AIDS and its prevention are also available upon request.

Contact Carol Roth at 867-3414, Mail Code CHS-005, for more information.

November is Native American Heritage month

On Nov. 9, the KSC Native American Intertribal Council (NAIC) hosted a demonstration Pow Wow, with the colors being presented by the Merritt Island High School ROTC, at KSC's Visitor Complex Rocket Garden.

Center Director Roy Bridges joined the celebration honoring Native Americans and participated in a traditional Native American dance honoring veterans of the United States armed services.



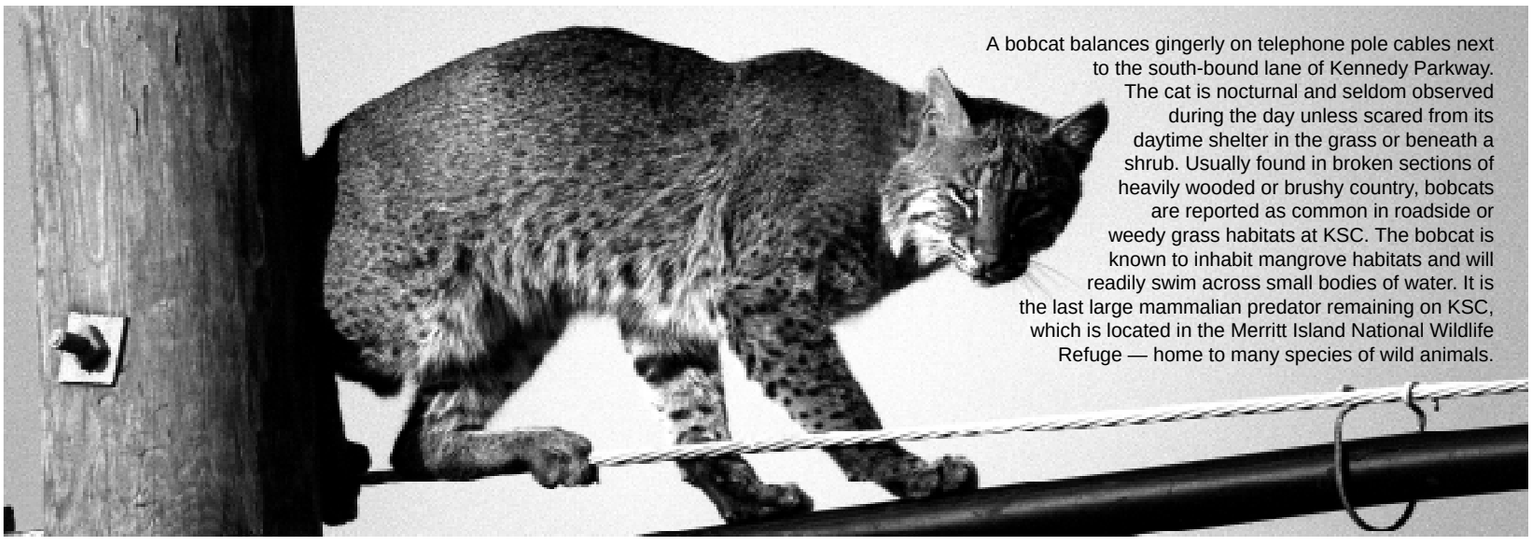
"This month is set aside for celebration of Native American heritage," said Bridges.

"We should all take the time to recognize the valuable contributions of Native Americans to society, as well as their contribution to the excellence and diversity of the KSC community," he said.

The Native American Intertribal Council is an organization for Kennedy Space Center employees of Native American descent. The NAIC is dedicated to celebrating the Native American culture and anyone interested in learning about native traditions. The council meets regularly to share native heritage, further cultural exchange and foster knowledge of our respective heritages.

November employees of the month

Honored in November were, left to right, Andy Swift, Launch Integration Office; Jim Norman, Administration Office; Laurie Griffin, Checkout and Launch Control System Office; John Knight, Installation Operations Directorate; Connie Sanchez, Procurement Office; Mark Terrone, Space Station Hardware Integration Office; Shannon Potter, Space Station and Shuttle Payloads Directorate; Seth Berkowitz, Logistics Operations Directorate; and Neil Spears, Payload Processing Directorate. Not shown are Mary Thompson, Safety and Mission Assurance Directorate; Shirley Bumatay, Office of the Chief Financial Officer; and Lon Piotrowski, Engineering Development Directorate.



A bobcat balances gingerly on telephone pole cables next to the south-bound lane of Kennedy Parkway. The cat is nocturnal and seldom observed during the day unless scared from its daytime shelter in the grass or beneath a shrub. Usually found in broken sections of heavily wooded or brushy country, bobcats are reported as common in roadside or weedy grass habitats at KSC. The bobcat is known to inhabit mangrove habitats and will readily swim across small bodies of water. It is the last large mammalian predator remaining on KSC, which is located in the Merritt Island National Wildlife Refuge — home to many species of wild animals.

Sterling Smith recently retired; NASA Buyout Plan approved

Former KSC Deputy Director of Payload Processing Sterling Smith retired recently from many years of dedicated service to NASA.

Smith began his NASA career at Goddard Space Flight Center (GSFC) in Greenbelt, Md., in 1962.

He worked first as a test engineer, then a systems engineer and later a flight operations director at GSFC, until he transferred to NASA Headquarters in Washington, D.C., in 1976 to work on the Spacelab program.

Smith served as program manager for a number of Spacelab missions for the Flight Systems Division at Headquarters from 1980 through 1984, when he was reassigned to GSFC as the project manager, Attached Shuttle Payloads.

In 1987, Smith moved over to the National Oceanic and Atmospheric Administration's National Weather Service as program manager in the service's modernization effort..

He transferred back to NASA Headquarters in 1988, where he remained until 1996 as chief of the Mission Implementation Branch of the Flight Systems Division. In this position, he was responsible for the program management of most of the Spacelab missions. He joined the ranks of the Senior Executive Service in 1987.

In 1996, he transferred to KSC and was named deputy director of Payload Processing and later acting manager, Payload Carriers Program, for Kennedy Space Center, where he remained until his retirement in September 1998 at the conclusion of the Spacelab program.

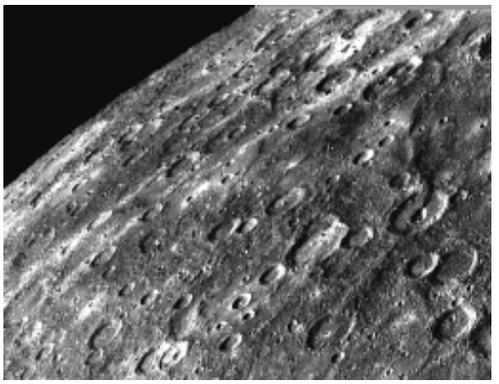
Other retirees in September included Saul Barton, management analyst; Bobby DeLoach, supervisor, electrical engineer/AST-Telecommunication; Charles Mills, supervisor, Quality Assurance specialist; Barton Scott, supervisor, contract specialist; and John Reiss, AST, electrical engineer.

Sterling Smith

KSC Buyout Plan for FY 1999

The Kennedy Space Center Buyout Plan for fiscal year 1999 was approved by the Deputy Administrator on Oct. 7, and the application and separation window opened immediately. The application window will close at 4:30 p.m. on Dec. 16, 1998, and all employees approved for the separation incentive must separate on or before Jan. 2, 1999. Employees who became eligible for an optional retirement between Apr. 1, 1998, and Jan. 2, 1999, have this last opportunity to receive the full buyout amount prescribed by law. Employees who do not accept this buyout will only be eligible to receive 40 percent of the amount allowed by law if a second buyout opportunity is offered.

More information about this buyout can be found at http://www.ksc.nasa.gov/admin/buyout/buyout99.html or contact Sharon Lowry at 867-2514 for details.



A Mariner 10 view of the Wren crater and surroundings on Mercury. The Wren crater is barely visible at the lower center of the image, containing a number of craters.

Mariner 10 launched 25 years ago this month

Destined for the planet Mercury, Mariner 10 was the seventh successful launch in the Mariner series and the first spacecraft to use the gravitational pull of one planet (Venus) to reach another (Mercury). The spacecraft launched Nov. 3, 1973, from Cape Canaveral Air Station atop an Atlas-Centaur rocket. Instruments on board Mariner 10 measured the atmospheric, surface, and physical characteristics of Mercury and Venus. Experiments included television photography, magnetic field, plasma, infrared radiometry, ultraviolet (UV) spectroscopy, and radio science detectors.

Mariner 10 was placed in a parking orbit after launch for approximately 25 minutes, then placed in orbit around the Sun en route to Venus. The spacecraft passed Venus on Feb. 5, 1974, and crossed the orbit of Mercury on March 29, 1974. A second encounter with Mercury, when more photographs were taken, occurred on Sept. 1, 1974. A final Mercury encounter with additional photography and magnetic field measurements occurred on March 16, 1975.

Engineering tests were continued until March 24, 1975, when the supply of attitude-control gas was depleted and the mission was terminated.

U.S. Laboratory for ISS arrives at Kennedy Space Center

One of the primary components of the International Space Station (ISS) arrived at Kennedy Space Center on Monday, Nov. 16, to begin pre-launch processing in the Space Station Processing Facility.

NASA's "Super Guppy" aircraft transported the U.S. Laboratory to Kennedy Space Center's Shuttle Landing Facility runway from the Marshall Space Flight Center, in Huntsville, Al., where it was built.

Serving as a world-class research facility in near zero gravity, the lab will provide astronauts a shirtsleeve environment for research in many areas, including life, microgravity, Earth and space sciences.

The facilities inside the lab are designed to yield a steady stream of findings from hundreds of high-quality science and technology experiments. It is the primary astronaut workstation for the United States involvement on the International Space Station.

The laboratory is scheduled for launch on Feb. 3, 2000, aboard the Space Shuttle Endeavour as part of the STS-98 mission.

The aluminum module is 28 feet long, 14 feet in diameter and weighs only 32,000 pounds.

The lab consists of three cylindrical sections and two end cones with hatches that will be mated to other station components. Comprising it are three cylindrical sections with two end cones. Each end-cone contains a hatch opening through which the astronauts will enter and exit the lab.

The exterior of the module is made of aluminum and features a waffle pattern that strengthens the hull.

It will be covered with an insulation blanket to protect the module from the harsh temperatures of outer space.

Next, an intermediate debris shield, made of material similar to that of bulletproof vests, will protect the module against space debris and micrometeoroids.

Finally, an aluminum debris shield will then be placed over the intermediate debris shield for added protection and to reflect the intense sunlight, reducing the load on the air conditioning system. Inside, four "stand-off" structures provide space for power lines, data management systems, vacuum systems, air conditioning ducts, and water lines, all supporting the space station's racks.

There are 24 racks inside the laboratory module, six on each side.

Of these, 13 are scientific racks dedicated to various science experiments; 11 are systems racks which will provide power, cooling water and environmental control.

A single, 20-inch round window is located on one side of the lab near the center. It is made of the highest-quality optical glass ever and provides a remarkable vantage-point to observe the Earth from the International Space Station.

The U.S. Laboratory for the ISS arrived Nov. 16 at KSC aboard NASA's "Super Guppy" aircraft. It is seen here being unloaded at KSC's Shuttle Landing Facility.

Collaborative Engineering Environment Rollout held

A Collaborative Engineering Environment (CEE) Rollout was held Nov. 12 at Kennedy Space Center to provide KSC senior management a detailed demonstration of new engineering tools and capabilities. The event was sponsored by KSC's Expendable Launch Vehicle and Payload Carriers Program Office.

The purpose of employing these new tools and technologies is to bring NASA and contractor engineering efforts to the next level of excellence and standardize their use across all NASA centers. In April, work began throughout NASA to define, develop and deploy three new levels of collaborative engineering capabilities across the Agency.

"Level 1 consists of basic data conferencing and is being provided through ODIN for KSC desktops and some conference rooms," said Mike Conroy, NASA CEE project manager. "Level 2 consists of video conferencing coupled with data conferencing tools, presentation tools, video conversion capabilities and an automation system. Level 3 adds synthetic and immersive virtual reality capabilities to Level 2 systems."

Two of the three applications that were demonstrated Thursday are already in place, according to Conroy. KSC has two operational Level 2 CEE rooms: Headquarters Room 3210 and Operations Support Building Room 5116. These rooms now have audio, video and data conferencing capabilities and will also have Level 3 capabilities at a later date.

"KSC's Operations and Checkout (O&C) Building Room 1291 now has Level 3 capabilities, with audio, video, data and virtual reality conferencing capabilities," added Conroy. "With the help of Boeing, Silicon Graphics and several KSC organizations, the room is operational, and modeling and 3D simulation are available in this new CEE environment."

O&C Room 1291 will support only KSC development activities.

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