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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

Mission Update

STS-87

Columbia
Launch: Nov. 19, 2:46 p.m.
Pad 39B
Launch window: 2 hours, 30 min.
Milestones: Six-member crew at KSC Oct. 2-3 for Crew Equipment Interface Test; payload bay door closure, Oct. 14; rollover to Vehicle Assembly Building, Oct. 24; rollout to pad, Oct. 29.

STS-91

Discovery (24th flight)
Launch: May 28, 1998
9th Shuttle-Mir docking
Milestones: OV-103 (above) was rolled over to the Vehicle Asasembly Building Oct. 1 for temporary storage to make room in the Orbiter Processing Facility(OPF)for the return of Atlantis. Discovery will roll back to the OPF in late October.

STS-88

International Space Station
Launch: July 9, 1998
Crew: Cabana; Sturckow; Currie; Ross; Newman
Milestones: Second Pressurized Mating Adapter (PMA-2) arrived Oct. 3. Shown above is PMA-1, already undergoing preflight preparation in the Space Station Processing Facility. The PMA serves as an interface between station elements.

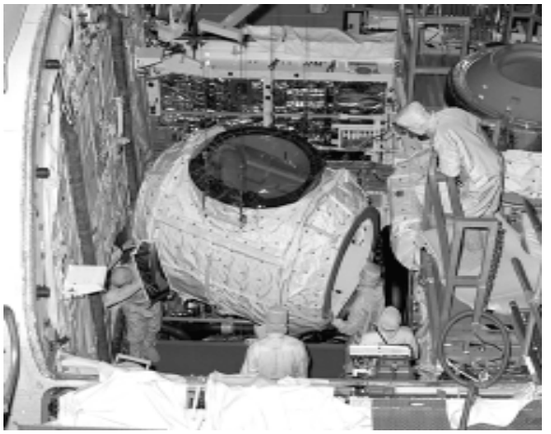
Getting ready for the year of space station

Modifications will give three orbiters docking capability

With the first International Space Station assembly flight less than a year away, workers in the Shuttle operations world are busy preparing the orbiter fleet for a new phase in human spaceflight.

Two of the four orbiters — Endeavour and Discovery — are undergoing modifications to give them the capability to complete the remaining two docking missions between the Shuttle and the Russian Space Station Mir, and to prepare for the International Space Station (ISS) assembly flights.

Endeavour will have the double distinction of becoming the second orbiter to dock with Mir and the first to fly an ISS assembly flight. Right now these two missions, STS-89 and STS-88 respectively, are set to occur just months apart (January and July 1998, respectively).



WORKERS in Orbiter Processing Facility Bay 1 install the Tunnel Adapter Assembly in the orbiter Endeavour. Spacewalking crew members will be able to venture outside through the hatch on top of the adapter.

Discovery completes the

(See ORBITERS, Page 6)

Another flawless flight

DRAG chute deploys after the Space Shuttle orbiter Atlantis lands on Runway 15 of the KSC Shuttle Landing Facility (SLF) at the conclusion of the nearly 11-day STS-86 mission. Main gear touchdown occurred at 5:55 p.m. EDT, Oct. 6. On Sunday evening, the Shuttle program reached a milestone: The total flight time of the Shuttle passed the two-year mark. STS-86 Mission Specialist David Wolf replaced NASA astronaut and Mir 24 crew member Michael Foale aboard the Russian Space Station Mir. Foale arrive at the outpost in mid-May. The other crew members are Commander James Wetherbee, Pilot Michael Bloomfield, and Mission Specialists Wendy Lawrence, Scott Parazynski, Vladimir Georgievich Titov of the Russian Space Agency, and Jean-Loup Chretien of the French Space Agency. Besides the docking and crew exchange, STS-86 included the transfer of more than three-and-a-half tons of science/ logistical equipment and supplies between the two orbiting spacecraft.

Cassini ready for journey to Saturn and Titan

The planet Saturn, its famous icy rings, and its enigmatic moon, Titan, are the prime scientific targets of the international Cassini mission, the most ambitious and far-reaching planetary exploration ever mounted.

Liftoff is set to occur on Oct. 13 during a window that extends from 4:55 – 7:15 a.m EDT.

The mission marks the first time a space probe has attempted to land on the moon of another planet, providing the first direct sampling of the Earth-like atmosphere of Titan and the first detailed pictures of its previously hidden surface. Titan is Saturn's

(See CASSINI, Page 5)

Employee team work, cost savings and innovation recognized throughout Quality Month in October

As in the past, October has been designated Quality Month. KSC is again planning several activities to reaffirm its commitment to Continual Improvement and quality. Upcoming Quality Month events include: A letter from Center Director Roy Bridges distributed to all employees; the ninth Annual KSC Teams Reception to be held at the Howard Johnsons in Cocoa Beach on Oct. 16th, with Center Director Bridges and motivational speaker Bob Moawad to be the featured speakers; astronaut visits with employees; posters displaying quality quotes and photos of those quoted on display in KSC cafeterias and lobbies; and KSC billboards displaying quality awareness information. Success stories recognizing quality contributions by KSC improvement teams will be presented in Spaceport News *in two parts. The first series begins below. Additional stories will be printed in the Oct. 24 edition.*

The Dynamac Corp.

Life Sciences Support Contract (LSSC) IOP (Internal Operating Procedures) Team

Mission: To provide a more efficient system to access the most recently developed or updated LSSC IOPs.

Method: A password-protected Web page was created on the internal server.

Results: This new Web page provides the capacity for all LSSC personnel to access, display, and/or print the latest IOPs from their desktop workstation regardless of their hardware platform, using a Web browser. This new capability also will support compliance with ISO 9000.

LSSC Electronic Approval System Team

Mission: A team was assembled to create a more efficient method of approving, processing, and tracking Purchase Requests (PRs) for the LSSC.

Method: An Electronic Approval System was developed that allows personnel to view the PR as it travels through the approval loop. Changes and/or bottlenecks can be identified quickly.

Results: Time required for approval has been lowered from weeks to days.

The Dynamac/Bionetics Corp.

LSSC Microgravity Plant Nutrient Experiment (MPNE) Team

Mission: Several areas of improvement involving scientific protocol, software implementation, and hardware design were identified for the MPNE, a Shuttle middeck spaceflight hardware functional demonstration.

Method: Science and engineering teams collaborated on nine complete end-to-end high fidelity tests of the system's performance under a variety of operational configurations.

Results: An improved method for the reliable on-orbit germination of seeds was developed. Several hardware and software modifications also were recommended and implemented, thereby reducing potential points of failure.

EG&G Florida

KSC Electronic Documentation System (KEDS) Application Development Team

Mission: The KSC engineering community requested 'view and print' network access to released engineering drawings.

Method: Released drawings are scanned by Sherikon Micrographics at the rate of 7,000/month and stored on a server. The team developed KEDS, an intranet Web viewer, to provide user-friendly access to these images.

Results: Over 150,000 images are now available from any Windows-based PC. This first KSC-wide application of its kind currently serves 950 users.

I-NET

Oxidizer Scrubber Team

Mission: Elimination of the second largest hazardous waste stream at KSC.

Method: The Toxic Vapor Detection Laboratory (TVDL) demonstrated a proposed Nox scrubber that replaces the current scrubber liquor. The new scrubber lowers Nox emissions and allows the spent solution to be used as a fertilizer, eliminating a hazardous waste stream, and reducing operation costs.

Results: The reduction in cost is due to elimination of waste disposal fees ($70,600) and a cost avoidance of fertilizer approximately $16,300/yr.

USBI

Thermal Protection System (TPS) Shop Kaizen Team

Mission: To improve shop layout and streamline hardware flow in the TPS shop processing areas.

Method: A team spent two weeks studying layout and hardware flow.

Results: A re-configured shop floor layout with about 1,500 square feet of additional available floor space was created. Over 40 piece of equipment were removed and movement of the booster aft skirts per flow was streamlined.

Document Closure Kaizen Team

Mission: To streamline closure and review of documents from work completion through data center processing.

Method: A 12-person team worked full-time for two weeks to study and improve the process. Activities included: developing a reference guide, creating a training package, and initiating a training plan for technicians to review stamp warranty issues.

Results: Created a new system which requires same-day review and document forwarding; reduced processing time by 84 percent; created centralized document pick-up centers; revised forms to provide feedback on errors to operational areas; and developed metrics for error trending.

Waste Reduction Kaizen Team

Mission: To reduce hazardous and solid waste, and reduce health and safety risks at Hangar AF.

Method: A 37-member team worked full-time for one week to study and improve four production processes. Activities included initiating facility changes, ordering safety equipment, and establishing new procedures.

Results: Initiated recycling of production materials in all four processes, eliminating 160,000 pounds annually from the waste streams; saved $28,000 annually in disposal costs; and eliminated safety and health hazards.

CENTER Director Roy Bridges (seated) gets his 1997 CFC pledge card from United Way Director Rob Rains (left). Also ready to complete their cards are Deputy Director for Business Operations James Jennings; Associate Director for Advanced Development and Shuttle Upgrades JoAnn Morgan; Deputy Director for Launch and Payload Processing Loren Shriver; and KSC CFC Chair Harry Silipo, associate director of Shuttle Processing.

Combined Federal Campaign under way through Oct. 31

In 1996, Brevard County federal employees donated more than $400,000 to the Combined Federal Campaign (CFC). More than half of that came from KSC pledges.

"We are the number one per capita givers in Brevard County," Center Director Roy Bridges Jr. told employees gathered for the CFC Kickoff in the Training Auditorium Oct. 1.

"I love this program — it is efficient and effective ...," he added. "It gives individuals the chance to focus their attentions on charities that are dear to them and, as a group, affords us the opportunity to support a wide variety of worthwhile organizations."

This year's theme for the KSC fund drive is *Combined for Caring* and the dollar goal is $200,000. Harry Silipo, associate director of Shuttle Processing, is the chairperson, and also is serving as co-chair for Brevard County.

CFC was formally established in 1961. Prior to that, on-the-job fundraising in the federal workplace was not well regulated. Quotas for agencies and individuals were set up, and supervisors pressured employees to donate money, according to a history of CFC on the Office of Personnel Management's Web site (http://www.opm.gov/cfc).

The first real combined campaign was held in 1964. Contributions have grown dramatically since then, from $12.9 million in 1964 to $82.9 million just 15 years later.

Payroll deduction is an easy way to donate to CFC. Last year, more than 92 percent of all CFC funds raised were given through payroll deduction. All civil service employees should have received their pledge card and booklet and can contact their key solicitor for more information.

FLORIDA Marlins baseball player Chris Clapinski, the featured speaker, told kickoff attendees, "I am very impressed with all of the amazing things that KSC does," he said, "and that as a group you still have time to be so supportive of our youth and other people in need."

October is National Disability Employment Awareness Month

The Disability Awareness and Action Working Group (DAAWG) has planned an Assistive/Accommodative Fair in conjunction with National Disability Employment Awareness Month.

The technology-oriented Fair will be held on Oct. 21 in the lobby of Headquarters Building and Oct. 22 in the Operations Support Building lobby from 10 a.m. – 3 p.m. each day.

Some of the vendors participating this year include Space Coast Center for Independent Living, Stuart Eye Institute of Jupiter, Fla., and Valencia Community College's Center for High-Tech Training for Individuals with Disabilities.

The theme for this year's Disability Employment Awareness Month is *Ability Bridge to the Future*. All KSC employees are encouraged to visit one of the locations and learn about the types of technology and services available to assist persons with vision, hearing, and mobility impairments.

KSC employees' spouses or family members who are 16 or older with disabilities may attend this year also by contacting Wanda Petty on or before Oct. 17 at 867-2307.

DAAWG advises the center director on matters relating to employees with disabilities and serves as a resource for the Equal Opportunity Program Office, the Administration Office and others.

Sterling Walker, Director of Engineering Development, is the chairman of DAAWG and Leon Wichmann of the Procurement Office is co-chair.

Center Director Roy Bridges, Jr. stated, "I am so proud of what our Disability Awareness and Action Working Group has accomplished over the years to make KSC accessible for our disabled employees. I invite everyone to join with me in recognizing that people with disabilities have boundless talent, vastly diversified skills, and abundant abilities for building the bridge to KSC's future."

In addition to inviting employees to visit one of the Fair locations, DAAWG also welcomes visitors to their home page on the Internet for all the latest information. The address is http://www.ksc.nasa.gov/groups/daawg.

Engineering Support Contract goes to small business Dynacs

Dynacs Engineering Co. Inc., Clearwater, has been awarded a contract to provide engineering support to KSC's Engineering Development organization.

The contractor will provide high technology and research services as well as engineering design and technician support.

"This year NASA named Dynacs Small Disadvantaged Business Contractor of the year and we look forward to a very positive relationship here at Kennedy Space Center," said Director Roy Bridges.

The cost plus award fee contract began Oct. 1, 1997 and, including the four one-year options to extend, potentially continues through Sept. 30, 2002.

The incumbent contractor I-NET, Inc., Bethesda, Md., is now classified as a large business and was ineligible for the competition. Thirteen companies total submitted bids for the contract.

Small Business Expo set for Oct. 29 at Port Canaveral

The eighth annual Business Opportunities Expo will be held Oct. 29 at Port Canaveral's Cruise Terminal 10, from 9 a.m. to 3 p.m. Admission is free.

More than 200 exhibitors from across the southeastern United States will display their products and services.

The potential prime contractors for the consolidated Joint Base Operations and Support Contract (J-BOSC) will be located on the second floor of the Cruise Terminal.

The expo is sponsored by KSC's Small Business Council along with the 45th Space Wing and the Canaveral Port Authority. For more information, call the NASA Central Industry Assistance Office at 867-7353.

AIDS information available

Education, knowledge and safe behaviors are keys to the prevent of AIDS. Packets of the latest information about this global problem are available at all three area medical facilities throughout the month of October, or by writing to Carol Roth, BOC-005. If you have any questions, call 867-2026.

Open House is Nov. 8!

Look for more information in the Oct. 24 Spaceport News.

Not just any day

FOR those unfortunate enough to not be "in the know," the date of Oct. 16, 1997, may not bear much significance. KSC workers who grew up watching the television series *Lost in Space* know better. It was on this date that the Jupiter 2 rocket carrying the Robinson family lifted off on the first colonization mission to a planet near the star Alpha Centauri, only to become "lost in space." The Science Fiction channel plans a *Lost in Space* marathon to commemorate the fictive anniversary. *Lost in Space*, the movie, is scheduled to hit movie theatres next April. Above, from left, the original cast from the CBS show that premiered in September 1965: Guy Williams, June Lockhart and Billy Mumy; the Robot, played by Bob May, with voice by Dick Tufeld; Jonathan Harris; Marta Kristen; Angela Cartwright; and Mark Goddard.

Merritt Island National Wildlife Refuge

Celebration set for Oct. 18 at Merritt Island Wildlife Refuge

Sinewy snakes and magnificent birds of prey will be featured at a celebration Saturday, Oct. 18, in honor of National Wildlife Refuge Week.

The event is set for 9 a.m. to 3 p.m. at the Merritt Island National Wildlife Refuge.

"This event is an opportunity for the public to learn not only about Merritt Island National Wildlife Refuge, but also about the other 500 plus refuges in the system," said Refuge Ranger Barbara Bolt.

In addition to the Audubon Center for Birds of Prey and Florida snakes, there will be demonstrations of wildlife management techniques and activities specially planned for children.

The highlight of the day will be the *Discover Your Refuge* Tour. Participants in this self-guided tour will learn about manatees, bald eagles, fire and water management techniques, and refuge residents such as song and wading birds.

At each tour stop, participants will have their tour map stamped, and each person who completes the map will get a prize. For more information, contact the refuge, tel. 861-0667, located four miles east of Titusville on State Road 402.

Honoring a job well done

CENTER Director Roy Bridges Jr. presented Saul Barton (second from left) with the 1997 Director's Award on Oct. 1 as Barton's wife Arleen and son Jeff proudly looked on. Barton, Strategic Planning manager in the KSC Administration Office, was commended for "extremely meritorious service" in the development of KSC's plan for the future and Bridges' presentation of the plan to both NASA Headquarters and KSC employees.

Cassini . . .

(Continued from Page 1)

largest moon, nearly the size of Mars and bigger than either Mercury or Pluto.

Cassini is a cooperative endeavor of NASA, the European Space Agency (ESA) and the Italian Space Agency, or Agenzia Spaziale Italiana. The mission will send a sophisticated robotic spacecraft equipped with 12 scientific experiments to orbit Saturn for a four-year period and study the Saturnian system in detail. The ESA-built Huygens probe that will parachute into Titan's thick atmosphere carries another six scientific instrument packages.

"With its bright, complex rings, 18 known moons and magnetic environment, Saturn is a lot like a solar system in miniature form," said Dr. Wesley Huntress, NASA's associate administrator for Space Science. "Saturn's family of rings and moons is a one-stop treasure trove, offering countless clues to the history of planetary and solar system evolution. Cassini and the Huygens probe represent our best efforts yet in our ongoing exploration of the solar system."

The launch period for Cassini's nearly seven-year journey to Saturn opened on Oct. 6 and closes Nov. 15. An Air Force Titan IVB/Centaur, the most powerful launch vehicle in the U.S. fleet, will loft Cassini onto the interplanetary trajectory that will deliver it to Saturn almost seven years later on July 1, 2004. The spacecraft's primary mission concludes in July 2008.

Saturn is the second-largest planet in the solar system and is made up mostly of hydrogen and helium. Its placid-looking, butterscotch-colored face masks a windswept atmosphere where jet streams blow at 1,100 miles per hour and swirling storms roil just beneath the cloud tops.

Saturn's best known feature — its bright rings — consists not just of a few rings but of hundreds of rings and ringlets broad and thin, composed of ice and rock particles ranging in size from grains of sand to boxcars. "Shepherd moons" found orbiting near the edges of some of the rings gravitationally herd in ring particles that would otherwise spread out into deep space.

Although it is believed to be too cold to support life, haze-covered Titan is thought to hold clues to how the primitive Earth evolved into a life-bearing planet.

It has an Earth-like, nitrogen-based atmosphere and a surface that many scientists believe probably features chilled lakes of ethane and methane. Scientists believe that Titan's surface is probably coated with the residue of a sticky brown organic rain.

On Nov. 6, 2005, Huygens will descend by parachute into Titan's sky, providing the first direct sampling of Titan's atmosphere and the first detailed photos of its hidden surface.

Because of Cassini's challenging mission, the long distance Cassini must travel, and the value of its scientific return, each component and the system as a whole has undergone an unprecedented program of rigorous testing for quality and performance.

Because of the very dim sunlight at Saturn's orbit, Cassini could not conduct its mission to Saturn on solar power.

Electrical power is supplied to Cassini by a set of radioisotope thermoelectric generators (RTGs) which convert the heat from the natural decay of plutonium. RTGs have been used on 23 previous U.S. missions.

The mission is named for two 17th century astronomers: Italian-French astronomer Jean-Dominique Cassini made key discoveries about Saturn, and Dutch scientist Christian Huygens discovered Titan.

PLUNGING IN — This artist's rendering shows the Huygens probe parachuting through the atmosphere of Saturn's moon Titan after being released by the Cassini orbiter. The orbiter will serve as a relay station, transmitting back to Earth the data collected by the probe.

LARGEST interplanetary spacecraft ever launched — More than half of the Cassini/Huygens mass of 12,295 pounds is liquid fuel, required for braking into orbit around Saturn. Here, the payload fairing is hoisted in place around the spacecraft at Launch Complex 40. Cassini's high-gain antenna — the light conical structure — is the upper most element of the spacecraft.

Cassini facts

• Cassini will travel 2 billion miles to reach Saturn and another 1.1 billion miles while in orbit around Saturn;

• Over 300,000 color images of Saturn, the rings,Titan and the other moons will be returned to Earth, including 1,100 pictures of Titan taken by the Huygens probe;

• Gravity assists from two swingbys of Venus and one of Earth will provide the equivalent of 75 tons of rocket fuel;

• Cassini will reach relative speeds of 18,720 miles per hour approaching Saturn and 30,660 miles per hour flying by Venus — equivalent to flying from Los Angeles to Boston in under five minutes;

• Ona busy day at Saturn, Cassini will transmit up to four gigabits of data — about a CD-ROM's worth — back to Earth.

Orbiters . . .

(Continued from Page 1)

currently manifested Shuttle-Mir docking series, following Endeavour to Mir in May on STS-91 to pick up the last U.S. astronaut from an extended stay on the Russian station.

Atlantis, which has flown the first seven Shuttle-Mir dockings, began its second Orbiter Maintenance Down Period (OMDP) upon returning from STS-86 Oct. 6, and will be shipped to California in November for modifications.

When Atlantis returns to KSC late next summer, it will complete preparations for the third ISS assembly flight. Endeavour will fly the second and Discovery the fourth.

(Columbia, the oldest orbiter in the fleet, is too heavy to fly either to Mir or to perform the station assembly missions.)

Certain elements are required for a Shuttle docking mission. The arrangement of these elements in the three orbiters is quite different at the present time, and the juggling of hardware which mission planners must undertake to meet the manifest reflects a program transitioning toward the future.

"It can be very confusing," observed Jeff Angermeier, NASA Multiflow Integration Manager. Take airlocks, for example. Originally, all four orbiters featured internal airlocks in the middeck. The airlock serves as the transition zone between the pressurized cabin and the outside when a spacewalk is performed.

Endeavour's internal airlock was removed during its OMDP, completed in 1996, and an external airlock equipped with fluid and power lines to support spacewalks was installed.

Discovery's internal airlock also has been removed. Its external airlock is positioned farther forward in the payload bay than Endeavour's. This position, called bay 2 (note bay positions on the diagram at right), is the preferred docking location for ISS flights and is referred to as the ISS position.

Endeavour's airlock is located one position farther aft, at the bay 3 or Mir position. This configuration will be used for the docking with Mir as well as the first two ISS flights.

The STS-88 crew requested this because having the docking hardware located farther aft provides better visibility during docking.

Flying Endeavour on a Shuttle-Mir docking prior to the first ISS flight also will allow checkout of its docking mechanism, which is shorter than the one used for Mir flights and designed to provide a softer docking.

"The STS-89 Shuttle-Mir docking will provide a good dress rehearsal for the first station assembly flight," said OV-105 Payload Project Manager Russ Brucker of United Space Alliance.

Atlantis is different from Endeavour and Discovery. To dock with Mir, Atlantis was outfitted with an assembly called the Orbiter Docking System (ODS), which features both Russian and U.S. hardware. Although the ODS looks like an airlock, it's not. Atlantis still has its internal airlock, which will be removed during the OMDP to free up interior space in the middeck. An external airlock, with a docking base on top, will be installed to support ISS assembly.

Another hardware element called the Tunnel Adapter Assembly (TAA) also has an important role in near-term dockings. The TAA has a hatch through which crew members can pass outside for a spacewalk.

There are two TAAs. One just flew on Atlantis and it was through this TAA that spacewalkers Scott Parazynski and Vladimir Titov made their way outside. The other TAA is in Endeavour's payload bay.

For the final two Shuttle-Mir flights and the first few ISS missions, the TAA will not always be located in the same position in the three orbiters' payload bays, necessitating modifications.

The TAA in Endeavour already has been modified; mods to the TAA flown on Atlantis will be made over the next few months.

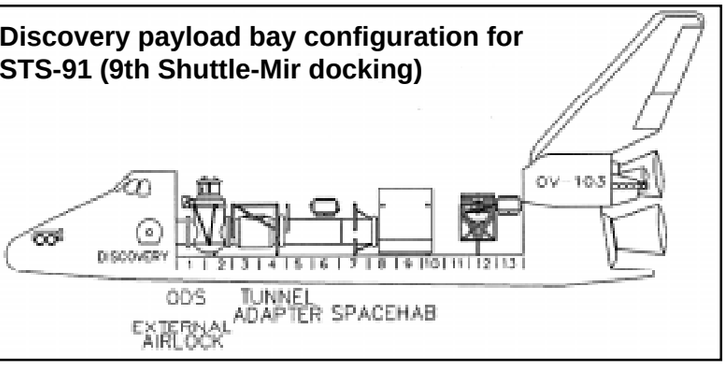
"At some point all ISS flights will be flown with the docking base in the bay 2 position," Brucker said. The TAA will no longer be required, since spacewalkers will venture outside via the external airlock.

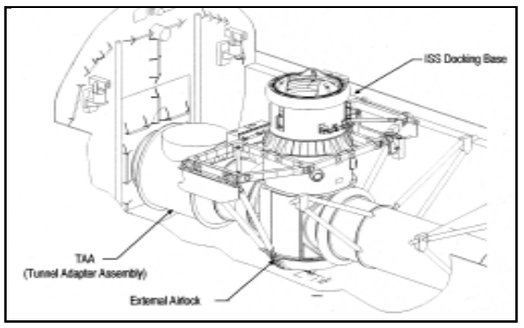
A third item also is changing to support the external airlock for ISS assembly. The Tool Stowage Assembly (TSA) replaces a piece of hardware located on the payload bay wall.

Positioned on the truss supports for the external airlock, the TSA provides an easily accessible place where spacewalk tools and equipment can be stowed.

Staying on top of the different configurations and making sure the hardware will be available when needed to support a mission requires vigilance and sharp planning, but people like Angermeier and Brucker take it all in stride. They relish being a part of the transition to a new phase in human spaceflight and welcome the challenge of making it a reality.

Discovery payload bay configuration for STS-91 (9th Shuttle-Mir docking)





OV-105 payload bay configuration for STS-89 and STS-88, the eighth Shuttle-Mir docking and first International Space Station assembly flights, respectively.

John F. Kennedy Space Center

Spaceport News

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