



Lyndon B. Johnson Space Center  
SPACE CENTER ROUNDUP  
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# Roundup



roll the dice

# FROM THE *director*

A MESSAGE FROM CENTER DIRECTOR MICHAEL L. COATS



**After one full year** as JSC director, I am more convinced than ever that I have the best job in the world.

The accomplishments of this space team over the last 12 months have been impressive by any standard. The shuttle has returned to flight with two challenging and completely successful missions, STS-121 and STS-115, and STS-116 is on track for a December launch. Three shuttle missions in six months would be a wonderful tribute to the hard work of a great team. The International Space Station is growing once again. We are back up to a crew of three, and a full crew of six is on the horizon. The space station team has made the complex and difficult look easy, and the international space team and international crews have performed magnificently. The space station flight control team now resides in our original Flight Control Room, FCR-1, newly refurbished and re-commissioned as an Space Station Mission Control Center.

The Constellation Program has staffed up and the crew exploration vehicle contract has been awarded right on schedule. We are off to a good start toward a first crewed flight by 2014, and perhaps sooner. Two contracts for the Commercial Orbital Transportation Services program were also awarded, a critical first step toward allowing NASA to eventually focus resources on exploring beyond low-Earth orbit. The Stardust spacecraft returned to Earth carrying samples of a comet and interstellar dust. Those samples were brought here to JSC and the results are stunning. We are rapidly making fascinating discoveries about our solar system, and the more we learn the more exciting and wondrous the universe becomes.

The Joint Leadership Team is working hard to ensure our government and contractor team functions smoothly together. All the NASA centers are coming together much better as a single integrated NASA team. "Governance models" for technical, safety and medical authorities are providing an effective system of checks and balances as we make difficult decisions in an operational space business. I have participated in and observed numerous Flight Readiness Reviews, L-2 and L-1 Reviews, and Mission Management Team meetings, and the highly-structured processes we now follow require full, open and detailed discussions from the whole team. It takes a lot of hard work to make the difficult and complex look easy. It's a privilege to work with such a dedicated and talented team of space professionals.

I've been spending a lot of time explaining to my twin granddaughters they really should consider careers in the space program someday. So far they haven't committed, or even commented much, but they're listening intently and smiling a lot. I think that's an encouraging sign since they're only four months old.

I can't wait for the next 12 months.

A handwritten signature in black ink that reads "Mike". The signature is written in a cursive, flowing style.

# Do not pass go...

DO NOT COLLECT \$200. GO DIRECTLY TO JOHNSON SPACE CENTER

by Kendra Phipps



## Want to visit Johnson Space Center?

Just wait your turn and roll the dice.

The center is now one of 22 American landmarks featured in Monopoly's new "Here and Now" edition. Earlier this year, an online contest was held by parent company Hasbro to determine which landmarks would become part of the game. JSC was up against two other Houston-area attractions: the Kemah Boardwalk and the Museum District.

Game players from all around the nation decided that JSC deserved a space on that famous board: the center received an overwhelming 79 percent of the Houston votes.

"We are very proud to be selected as one of America's best landmarks by so many Monopoly fans across the country," said Roger Bornstein, marketing director at JSC's visitor center, Space Center Houston (SCH). Bornstein and SCH President Richard Allen represented JSC as the winning locations were unveiled in New York City's Times Square on Sept. 12.

Also on hand for the celebration was Mr. Monopoly, the top hat-wearing, mustachioed mascot of the game, plus an astronaut character from SCH and a few feathered showgirls representing Las Vegas Boulevard.

In most cities, a cast of characters like that would attract plenty of attention. But "it was just another day in New York," said Bornstein with a laugh. Times Square was chosen for the ceremony because it was the top vote-getter in the contest, earning the prestigious Boardwalk slot on the game board.

JSC's spot was formerly occupied by Tennessee Avenue, and features a picture of the Saturn V. Game players wanting to "buy" the space center will have to shell out a cool \$1.8 million. The inflation-adjusted prices and new landmarks aren't the only changes: airports have replaced the railroads, and game pieces such as laptops and cell phones have replaced the old-school thimble and cannon.

The "Here and Now" version is a limited edition and will not replace the original Monopoly, which has been in production since 1935. Bornstein said that he was impressed by the enduring popularity of the game, and that he played it as a kid.

"Who didn't?" he said. "It's one of the few board games my grandkids play. It's nice to see kids playing a board game when the electronic games are so popular."

JSC received a plaque commemorating its spot on the game board, which will be displayed in a conference room at SCH. But the bigger rewards are the awareness and appreciation of the space center that come with JSC's inclusion in the game.

"I think it's awesome," said Bornstein. "We're in some great company: (JSC) is up there with Times Square, the Golden Gate Bridge, South Beach... (It's) just a terrific statement of the public perception of who we are. I think it gets reinforced every time someone plays Monopoly."

Now that JSC has taken over Tennessee Avenue, Bornstein has set his sights on the Peppermint Forest.

"Today, Monopoly; tomorrow, Candy Land!" he said.

## FUN FACTS

- The space shuttle is a game token in 2002's "America Edition," along with apple pie and the Liberty Bell.
- More than 250 million copies of Monopoly have been sold in 80 countries and 26 languages.
- There have been more than 200 different editions of the game created, including versions based on TV shows, universities and sports teams.
- The original game is based on the streets of Atlantic City, N.J.
- In 1999, players voted the "Sack of Money" as the newest Monopoly token.
- The longest Monopoly game ever played lasted 1,680 hours.



HOMELAND SECURITY  
PRESIDENTIAL DIRECTIVE 12

# A new frontier for security

by Catherine E. Borsché

NASA as an agency is getting futuristic—and not just in the realm of space and exploration.

In the coming months, Johnson Space Center team members will notice changes in security measures being implemented on site, all because of Homeland Security Presidential Directive (HSPD) 12. The directive mandates that all government agencies will implement security controls and measures under the direction of the National Institute of Standards and Technology.

And while you won't be seeing machines that scan your retina to allow access into buildings, as you may have read in popular science-fiction books, new technologies will usher JSC to the cutting edge of safety and security.

The advent of the smartcard, a badge equipped with a computer chip to store information, will ensure greater controls for both the physical and Information Technology (IT) environment at JSC.

"We will have identities that are thoroughly vetted and validated for every individual that accesses a NASA system, facility or information. We're required to make sure that each individual has the proper investigation or background check," Lynn Vernon, JSC HSPD 12 Implementation manager and chief of Information Systems and Applications Division, said.

With a common identity across all government agencies, access to other centers or government institutions will be easier. JSC team members visiting other centers can use the same badge to get in and will not have to undergo any additional background checks. Those moving between centers will have significantly less interruption when accessing IT systems and data.

Prior to HSPD 12, NASA was already embarking on several agency initiatives to help improve the overall security posture and capabilities of the agency. HSPD 12 is emphasizing the need for NASA to create an integrated agency architecture, which will create spin-offs such as an agencywide system to manage all computer accounts.

"The other element you will see is you will now have to use your smartcard to get to the systems that you normally get to today with an ID and password," Vernon said. "We will require you to plug your smartcard into your computer before you can actually get on the system and get to any NASA data." This will improve security while providing users a simpler method of getting to their systems.

The smartcards will also contain security data specific to each employee.

"The agency's getting ready to do a 'Create an Identity' process. To get someone a credential right now, their identity has to be created first," Scott Robinson, JSC Security lead, said. "Once a person's identity is created, it's then pushed over into the badging system. That person must appear before one of our badge clerks and present the two forms of I-9 data. A smartcard will capture two of their fingerprints, and the other biometric for the card is the facial image."

Once the individual's background check is complete, fingerprints will then be matched up to the person before their smartcard is activated.

"There is a layer of security that was not there before," Robinson said. "You can rest assured knowing that the person coming through the gate or getting access to your systems has been cleared or properly vetted."

HSPD 12 is being introduced in phases. The current re-badging effort for civil servants and contractors is just the first step in obtaining the proper background checks and verification of two forms of I-9 data. The smartcards will be issued to all permanent employees with an expected completion date of October 2007.

Management is looking to implement HSPD 12 with as little disruption to the workforce as possible. Although such a widespread change will pose challenges, JSC is already one step ahead in anticipating obstacles and working to prevent issues before they arise.

"The key is that we have to meet the policy and requirements of HSPD 12. But we want to implement this smartly across the agency," Vernon said. "Our goal is that we will not do anything to break our budget, break our centers, break our programs or our mission. That comes first. We will look at how to take the big picture and execute chunks in a reasonable fashion to minimize the impact."

For more information on HSPD 12, visit the JSC Security Web site: <http://www6.jsc.nasa.gov/ja/news/newsfiles/1993.doc>

## HSPD 12: What's in it for me?

### How will HSPD 12 improve the center and its operations?

HSPD 12 is designed to enhance security, increase efficiency, reduce identity fraud, protect personal privacy and increase mission success.

### What changes will I notice as HSPD 12 is implemented?

- There will be changes to "in processing" processes and procedures for all civil servants, contractors and partners.
- Everyone who has a permanent badge today will be issued a smartcard badge.
- Employees will all have, at the minimum, an NAC-I background investigation.
- Anyone who gets access to an IT system or application must first have a validated identity.
- Access to IT systems and applications will be controlled more tightly than ever before.
- All systems and applications will be retrofitted to accommodate two-factor authentication, or two forms of proof for access, such as a smartcard and a PIN or password.
- NASA will adopt a Cyber Identity Management System, which will work as a new glorified X500 phone directory. This system will take all the validated identities and provide improved information for every individual.



## STS-115 CONCLUDES A WHIRLWIND MISSION

by Catherine E. Borsché

**A**fter a picturesque night landing, Space Shuttle *Atlantis* returned to Earth Sept. 21, ending a jam-packed 12-day mission that reignited International Space Station assembly efforts and also tested NASA's crunch-time decision-making capabilities.

While hurtling through 4.9 million miles of space, STS-115 delivered and installed the massive P3/P4 truss, an integral part of the station's backbone, and two sets of solar arrays that will eventually provide one-quarter of the station's power.

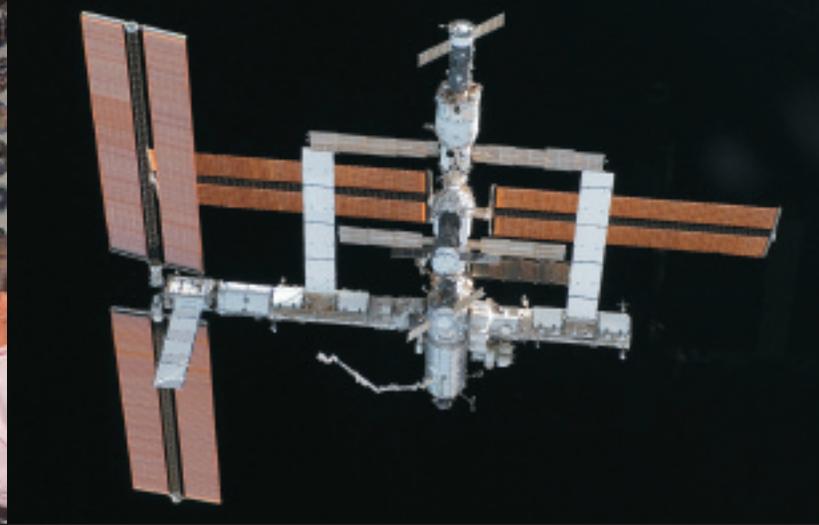
*Atlantis*' Commander Brent Jett, Pilot Chris Ferguson and mission specialists Joe Tanner, Heidemarie Stefanyshyn-Piper, Dan Burbank and Steve MacLean, a Canadian astronaut, were excited to be part of this historic effort. After landing, Jett said to Mission Control at Johnson Space Center, "Thanks, Houston. It's nice to be back. It was a great team effort, so I think assembly's off to a good start."

The flight was the first in a series of missions that will be among the most complex in space history. *Atlantis* delivered the first major new component to the station since 2002 and laid the groundwork for upcoming station assembly missions.

STS-115 is one of the most photographed shuttle missions ever, with more than 100 high-definition, digital, video and film cameras documenting the launch and climb to orbit. Data from these images, as well as station and shuttle crew inspection, helped to clear *Atlantis*' thermal protection system for return only two-and-a-half days after launch.

Tanner, Piper, Burbank and MacLean, with the help of crewmates, made three spacewalks that completed truss installation, enabled solar arrays to be deployed and prepared an important radiator for later activation. They also installed a signal processor and transponder that transmits voice and data to the ground and performed other tasks to upgrade and protect the station's systems.

A new procedure called a "campout" was implemented, in which astronauts slept in the Quest airlock prior to their spacewalks. The process shortens the "pre-breathe" time during which nitrogen is purged from the astronauts' systems and air pressure is lowered so the spacewalkers avoid the condition known as the bends. On each of the three spacewalks, the astronauts were able to perform more than the number of scheduled activities.



**Top left:** *The Sept. 9 launch of Space Shuttle Atlantis is reflected in nearby water.*

**Bottom left:** *STS-115 and Expedition 13 crew members enjoy a light moment in the station's Unity node.*

**Top right:** *Mission specialist Heidemarie Stefanyshyn-Piper can be seen working at one of the space station trusses in the center of this photo, taken during the final spacewalk of the mission.*

**Bottom right:** *This view of the space station was taken shortly after Atlantis undocked from the orbital outpost.*

The astronauts performed unprecedented robotics work. They used the shuttle's arm in a delicate maneuver to hand off the school bus-sized truss to the station's arm. The 45-foot truss weighs 35,000 pounds. The arrays at the end of the truss extended to their full 240-foot wingspan once they unfurled on Flight Day 6. The astronauts also moved the station's robotic arm to a position where it will assist in the next phase of station construction.

After *Atlantis* undocked from the station, it did the first full fly-around of the facility since prior to the Space Shuttle *Columbia* accident. The maneuver helped ground crews get a better perspective on the station's environment and overall exterior health.

On Flight Day 11, the crew and Mission Control were tested when an unidentified object was observed in close proximity to the spacecraft following standard tests of *Atlantis*' reaction control system. Flight controllers and engineers got together to analyze the situation, and Mission Control then determined that a thorough inspection of the heat shield was warranted before clearing the shuttle to land.

The astronauts used cameras on the shuttle's robotic arm to conduct the scans, and imagery specialists and engineers reviewed

the data from previous activities. These specialists did not see any areas of concern from the first inspection, but decided to do a more complete inspection with the Orbiter Boom Sensor System to ensure *Atlantis*' safe return. Their combined teamwork and quick thinking showcased the professionalism of the entire shuttle team and NASA's commitment to safety.

Canadian Prime Minister Stephen Harper made a call during the mission to astronaut Steve MacLean to congratulate him on being the first Canadian to operate Canadarm2, the station's Canadian-built robotic arm.

After undocking, the *Atlantis* crew participated in a first-ever three-way call with the Expedition 13 crew aboard the station and the three crew members of the Soyuz spacecraft on their way to the station. All 12 astronauts in space at that time were able to have a conversation.

With *Atlantis* and its crew safely home, the stage is set for the next stage of station assembly. Preparations continue for Space Shuttle *Discovery*'s launch, targeted for December, on the STS-116 mission to deliver an additional truss segment and a cargo module to the station. *Discovery* will also do extensive work on the station's electrical and cooling systems.

Connecting the next generation of explorers to the moon, Mars and beyond

# Taking learning to the extreme

by Debbie Nguyen



**FOR STUDENTS**, a field trip usually entails a visit to the museum, the zoo or the park.

But through NASA's Digital Learning Network (DLN), more than 10,000 students nationwide can add the desert, the ocean floor and Antarctica to their field trip.

Johnson Space Center's hub of the DLN uses video conferencing and webcasting technology to send classrooms on virtual field trips to these extreme environments, where they are connected to NASA scientists and engineers on research expeditions. In addition, each participating school is allowed to ask the experts questions. NASA team members and the public can also observe the webcast sessions.

JSC's DLN team hosts about 650 DLN events per year, reaching nearly 26,000 students. To better equip the students for these exotic locations, the DLN also provides educators with pre-event classroom activities that are aligned to the missions' objectives and national education standards.

"These connections are teaching today's students to explore their own backyard, the Earth and how it correlates with ventures

to the moon, Mars and beyond," said Erika Guillory, a DLN education specialist. "We're showing them just how accessible these future missions are now."

Prior to some of the connections, the DLN team of videographers, producers and a field host will travel to the site, set up the connection and line up experts. In the meantime, the television director, on-camera host, technical specialists and NASA subject-matter experts prepare in the DLN studio, housed in the Space Vehicle Mockup Facility at JSC.

"Once the lights go on, we're live from beginning to end," said Don Caminati, the DLN's television director and technical specialist. "It takes a lot of choreography. We've connected schools from as far as Maine and Alaska to Antarctica."

For the past three years, the DLN has taken classrooms to Arizona's Meteor Crater for the Desert Research and Technology Studies, or Desert RATS, project. Though far from Mars, students hear from the experts about how NASA is using the desert's rough terrain and temperature extremes as a test bed for prototypes of future spacesuits, robots and rovers.

The Desert RATS team includes about 100 engineers and scientists from JSC, Glenn Research Center, Kennedy Space Center and Ames Research Center, and representatives from industry and academia.

“I firmly believe that part of my job as an engineer for NASA is to reach out to the public and inspire students,” said Heather Paul, the ventilation subsystem manager for JSC’s Advanced Space Suit Life Support System and field reporter for this past year’s DLN Desert RATS series. “I think it is good to show students that being an engineer or a scientist doesn’t mean that you sit in a laboratory all day, and that it takes many types of people working together as a team to accomplish our goals for exploration.”

But the journey doesn’t end with Desert RATS. The next destination is located three miles off the coast of Key Largo, Fla., and 63 feet below the surface: It’s Aquarius, the National Oceanic and Atmospheric Administration’s underwater laboratory. Here, a team of astronauts live and work in the undersea lab for several days as part of the NASA Extreme Environment Mission Operations (NEEMO) project. Since NEEMO 1 in 2001, the DLN has been splashing down with the “aquanauts,” who also act as the field reporters for the connections.

Leveraging the ocean’s environment, the crew is able to perform undersea “spacewalk” activities that will help NASA build better spacesuits for future trips to the moon. Techniques for communication, navigation, construction and utilization of remote-controlled robots can also be tested in weightless-like conditions.

DLN events give students the chance to interact with the underwater explorers.

When a student from astronaut Sandra Magnus’ hometown of Belleville, Ill., asked the astronaut about her favorite part of the NEEMO 11 mission in September, Magnus compared it to the highlight of her 2002 space shuttle mission.

“The best part of being underwater is the same thing as in space—that’s the view out the window,” said Magnus. “It’s like watching the Earth go by out the shuttle or station window. You see the planet in its natural state and it’s just wonderful. You’re living in a reverse aquarium.”

To wrap up the tour of extreme environments, the DLN will virtually send students to the South Pole this winter for the Antarctica Search for Meteorites, or ANSMET, program, which is sponsored by the National Science Foundation. Students will be able to speak with the team of NASA geologists and scientists collecting meteorite samples to be analyzed at JSC. After the ANSMET team (usually comprised of geologists, meteoriticists, and other scientists) collects meteorites, the samples are brought to JSC and made available to the scientific community for research and analysis.

“The education activities will allow students to understand how working in extreme environments, like Antarctica, can provide a good foundation to understanding the extreme environment of space,” said Guillory.



NASA\_JSC2006E36897

*Above: Diane Di Massa, Professor of Engineering at University of Massachusetts, Dartmouth, prepares to collect a meteorite found in the Lapaz region of Antarctica, 250 miles from the South Pole.*



NASA/Markowitz\_JSC2005E48087

*Left: Dr. Jennifer Rochlis from JSC’s Robotic Systems Technology Branch, talks about the Science Crew Operations Utilities Test bed with field reporter Heather Paul during a live DLN broadcast of the 2005 Desert Research and Technology Studies project in Arizona.*

# New home for station flight controllers

by Kylie Clem and Kendra Phipps

**I**nternational Space Station flight controllers now have some new digs.

Actually, their “new” workspace is old—it’s one of JSC’s original flight control rooms (FCRs), commissioned in 1965—but it’s been updated and customized for space station operations.

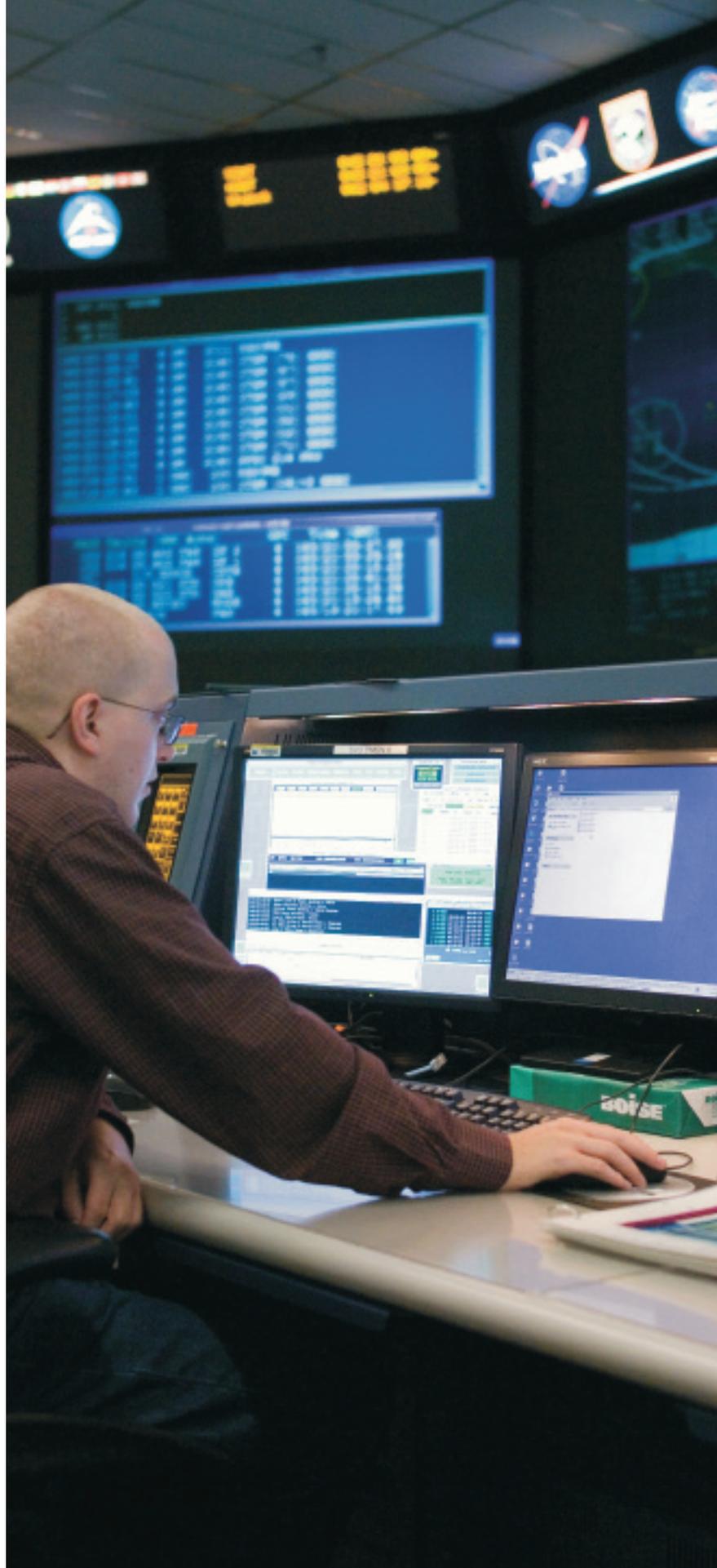
The complexity of upcoming assembly tasks spurred the relocation of the control hub down the hall to the room, called FCR-1. After nine months of remodeling work, including clever changes to the existing hardware to minimize expenses, the station team moved in on Oct. 6.

The relocation was coordinated by lead station flight director John McCullough and completed by a team of employees from across the center. On Oct. 11, having finished the renovations and systems testing on a tight schedule without interruption of critical space station operations, the team gathered in FCR-1 for a ribbon-cutting ceremony to celebrate the project’s completion.

FCR-1 was one of two rooms developed for Apollo spacecraft operations. It also supported Skylab and 55 shuttle missions.

The previous station control room, commonly referred to as the Blue FCR, had about 16 consoles and served as the base of operations for specific flight control disciplines, such as space station electrical and environmental systems.

*Flight controller Michael Erdmann, Barrios Technology, is seated at the THOR console.*



## OUT OF THE OLD...

One of the main challenges with the Blue FCR was that several flight control disciplines had to share consoles, with some flight controllers getting “kicked out” depending on current station activities. For example, during robotic arm operations the ROBO officer would take precedence over the trajectory officer, who used the same workstation, and the latter would be forced to work temporarily from a backroom. At other times, the entire team had to relocate.

“When we were doing complex operations, such as spacewalks, launches or rendezvous and dockings, we had to relocate to the larger shuttle flight control room or use backrooms,” said McCullough. “In that configuration the team didn’t have the best possible situational awareness of what was going on.”

In addition, the ATLAS and TITAN team members—flight controllers who work off-peak shifts and cover several disciplines at once—were forced to go back and forth between workstations to get the information they needed.

Overall, the Blue FCR’s limited desk space, console shortage and awkward equipment configuration made it “pretty ergonomically challenging,” said McCullough.

## ...AND INTO THE NEW

By contrast, FCR-1 has plenty of consoles—20 to be exact—and more room in general for the safety and comfort of the flight control team. The existing consoles in the room, most recently used to monitor space station science, were updated for station vehicle operations. Bookshelves were built into each row of workstations, adding much-needed document storage space. Printer stands were added, flat-screen monitors saved desk space and the overall height of the consoles was lowered to improve visibility among team members. Making updates such as these, rather than completely replacing equipment, kept project costs low.

The room also has three giant screens on the front wall to display vehicle information, rather than the two in the old room, and high-definition cameras with video feeds converted for NASA TV

broadcast. FCR-1 will make use of the original observation room behind it for tours and other guests.

To make FCR-1 available for the space station team, the previous occupants were moved to another room in Building 30, and the team that had been using that room also had to be relocated.

“It was a pile of dominos to move everybody around and keep them happy,” said McCullough. It took the cooperation of dozens of teams and offices to make the move possible, including the Information Resources Directorate, Center Operations, ODIN, Lockheed Martin, United Space Alliance, the JSC Information Management and Media Services contract and many others.

In preparation for the relocation, the station flight control team moved into the shuttle flight control room soon after the STS-115 landing. The shuffle allowed the transfer of computers and simulated operations in the new room before real-time station operations began.

All of the shuffling seems to have been worth it, and the flight controllers are settled into their new, yet historic, home.

The original 61 mission plaques from flights supported from FCR-1, including the first, Apollo 7, are all displayed on the walls again. They had been relocated to FCR-2, which was the other original flight control room and is now a national historical landmark in Mission Control.

The first new mission plaque to be added in FCR-1 will be for the joint shuttle and station assembly mission, STS-116/12a.1, in December. The plaques in the Blue FCR will remain in place as a symbol of the operations based out of that room. However, the Expedition mission plaques have been replicated in the new room to represent all long-duration space station operations.

Chief flight director Phil Engelauf said that he was pleased that station flight control will now be based out of such a historical space.

“I like to hearken back to the Apollo operations and think that the ghosts from that time are still in the room,” said Engelauf. “The symbolism is not lost on the new generation of flight controllers working there now.”



**Top photo:** A PHALCON flight controller is shown working in FCR-1.

**Above:** Flight controllers Tim Finkel and Diane Dailey work at the ECLSS console.



NASA/Geesman JSC2006e46029

NASA/Markowitz JSC2006e46062

*Hundreds of visitors flocked to Ellington Field Oct. 21-22 for the annual Wings Over Houston airshow.*

## Space Center Roundup

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