

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.

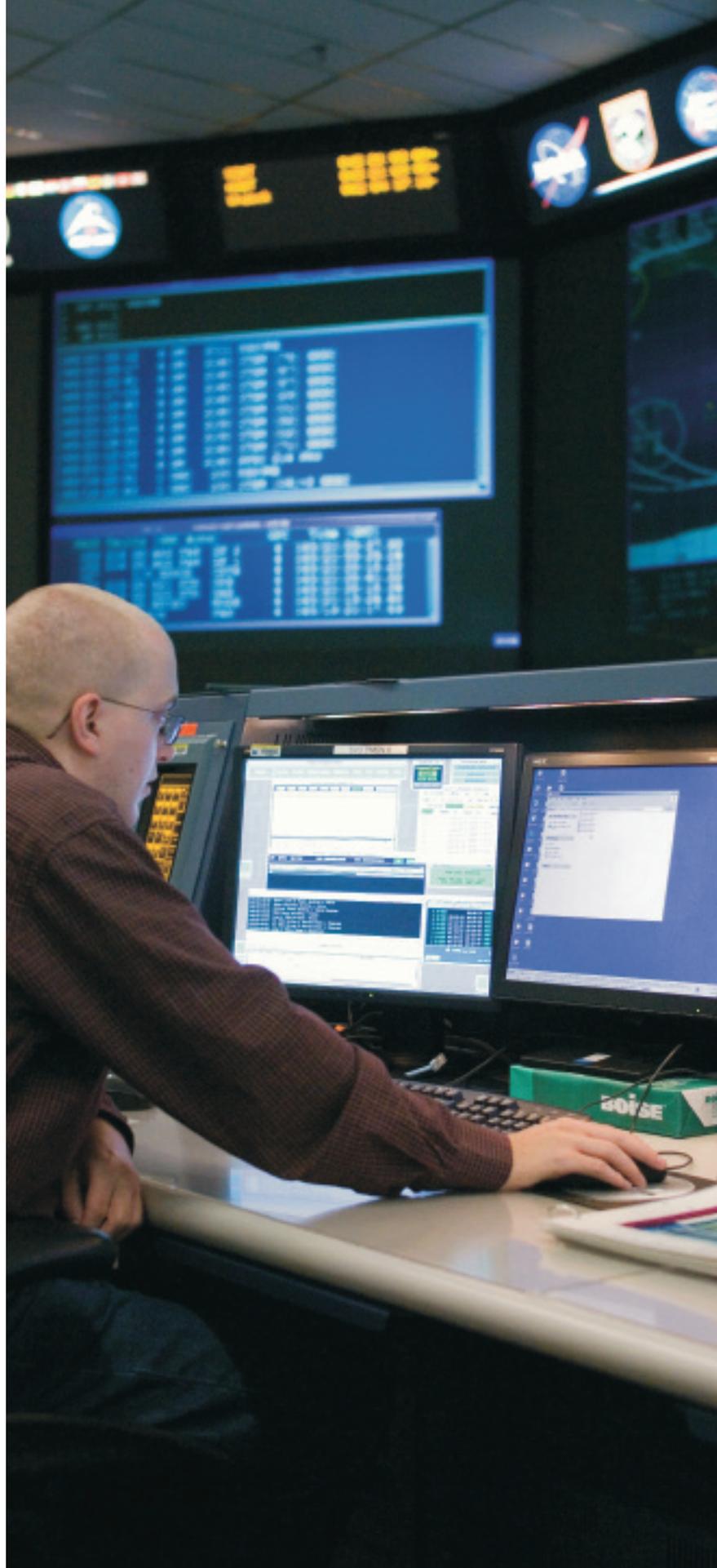
The complexity of upcoming assembly tasks spurred the relocation of the control hub down the hall to the room, called FCR-1. After nine months of remodeling work, including clever changes to the existing hardware to minimize expenses, the station team moved in on Oct. 6.

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.



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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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