

# Space News **ROUNDUP!**

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## Hatch closing behind last Mir astronaut

By John Ira Petty

For the first time since March 1996, a space shuttle visiting Mir won't be leaving an astronaut aboard the Russian space station.

When *Discovery* undocks to return home, more than 26 months of continuous U.S. presence on Mir will end as Phase 1 of the International Space Station Program comes to a close. Astronauts have spent a total of almost 1,000 days on Mir.

Perhaps half of the STS-91 flight,

a 10-day mission, will be devoted to a multinational experiment called the Alpha Magnetic Spectrometer. AMS is the first of a new generation of space-based experiments that use particles instead of light to study the universe.

The experiment will help answer questions about the creation, growth and future



The shuttle's robotic arm also will be

into questions surrounding the "Big Bang theory," searching for anti-matter and dark matter in space. In *Discovery's* cargo bay on a verification flight, the AMS is to remain on the International Space Station for several years.

Other experiments aboard *Discovery* include two Getaway Specials.

tested with its new station-related equipment. The shuttle also will release a tracer gas into Mir's damaged Spektr module to try to pinpoint a leak.

The launch was to be the first flight of the new, super-lightweight external tank, which weighs about 7,500 pounds less than the original.

STS-91 Commander Charlie Precourt will be making his fourth space flight. This is Pilot Dom Gorie's first

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NASA Photo 98-04117

**Astronaut Bill Shepherd, right, commander of the first crew that will live aboard the International Space Station, and Cosmonaut Sergei Krikalev, left, flight engineer for the first crew, practice survival skills during training in March 1998 near Star City, Russia. The crew, which also includes Cosmonaut Yuri Gidzenko as Soyuz commander, participated in two days of Soyuz winter survival training to practice skills that could be needed in the event the Soyuz spacecraft landed in a location where the crew could not immediately be reached.**

## New phone book hits street

JSC's new Spring 1998 telephone directory hit the street this week, but only a limited number of copies will be distributed. All JSC civil servants will receive a printed copy and a limited number of copies will be sent to other NASA centers and contractor offices.

Everyone is encouraged to use the on-line directory on the JSC Internal Home Page at <http://www4.jsc.nasa.gov> for the latest information. The ability to make the phone book available and quickly update it "on-line" will allow the center to save a significant amount of money by reducing the number of copies it prints and distributes. Not only that, the on-

line directory is updated continuously as the Information Systems Directorate is notified of moves, additions, deletions and other changes.

Some organizational or telephone number changes may not be in the new directory because of the necessity to meet printing deadlines. To ensure corrections are made to the on-line directory and that the next printed directory captures any new information, employees should be sure to process changes through their organization's CTS Coordinator.

Employees also are encouraged to recycle their old JSC Phone Directories by placing them in their standard recycling trays.

## Partners revise space station launch targets

Representatives of all nations involved in the International Space Station are officially targeting a November 1998 launch for the first station component and are revising launch target dates for the remainder of the 43-flight station assembly plan.

In meetings of the Space Station Control Board and the heads of agency May 30-31 at Kennedy Space Center, all station partners agreed to target launch dates of Nov. 20 for the Control Module, also known as the FGB and named Zarya (the Russian word for sunrise), and Dec. 3 for STS-88 with Unity, previously known as Node 1.

Changes in the construction schedule for the third station component, the Russian-provided Service Module, led the partners to reschedule the first assembly launches. The Service Module will house the first station occupants and the European Space Agency provided Data Management System.

Although the new dates move the launch of the first station component, Zarya, from June to November, the target dates agreed upon for many major station milestones during the latter portions of the five-year assembly plan are little changed. In addition, several enhancements to the station's assembly have been made, including an exterior "warehouse" for spare parts and a Brazilian-provided carrier for exterior station components that are launched aboard the shuttle.

The International Space Station partners set an April 1999 target launch date for the Russian Service Module. The first station crew—expedition Commander Bill Shepherd, Soyuz Commander Yuri Gidzenko and Flight Engineer Sergei Krikalev—will be launched aboard a Russian Soyuz spacecraft in summer 1999 to begin a five-month inaugural stay. Launch of the U.S. Laboratory module is set for October 1999. Launches of other laboratory modules, provided by Europe, Japan and Russia, will take place later in the assembly sequence. The Canadian-provided station robotic arm, or Space Station Remote Manipulator System, will be launched in December 1999. The scientific research will commence aboard the station early in the year 2000.

The expansion from a three-person crew to a six-person crew will be announced later this year. Please see **RUSSIA**, Page 8

## On-line ordering available for Earth images taken by astronauts

Images taken by NASA astronauts flying high above the Earth aboard the space shuttle can now be ordered on-line.

The "Best 500" images from the NASA Space Shuttle Earth Observations Photography database of more than 250,000 images have been available for free downloading for quite some time. Now, thanks to a trial cooperative effort between JSC's Space and Life Sciences Directorate, Information Systems Directorate, Public Affairs Office and the Eastman Kodak Co., the public may purchase high-resolution photographic prints of the images over the Internet.

Kodak's Commercial & Government Systems unit activated its on-line ordering site on May 22 as part of a market trial agreement with JSC aimed at determining public interest in obtaining quality digital prints of images from NASA missions.

Anyone who would like to order a print is asked to search the Space and Life Sciences-developed Earth observations image database at <http://earth.jsc.nasa.gov/>. When the search results are returned, users will see a link labeled "Order a Photographic Print of (Photo number)." Clicking on this link will take the user to a Kodak site that will allow them to input their order.

Images range in size and price from 8-by-10 inches at \$13.95 to 20-by-24 inches at \$29.95, and include a location map, title and north locator.

Dr. Kam Lulla, chief of JSC's Earth Science Branch, is in charge of NASA's Earth observations photography collection. Ric Slater, ISD's technical monitor for imagery, is in charge of the Internet image database, and the IMPASS contractor manages the web site. PAO's Kelly Humphries is JSC's project manager for the trial agreement.





# Bags packed, Thomas writes about view from space

By John Ira Petty

The bags were just about packed last week, and it was a good bet that Andy Thomas was ready to go.

After a productive and rewarding stay on the Russian space station Mir, Thomas is scheduled to return to Earth on June 12. If all goes as scheduled, Thomas will have spent more than 20 weeks in orbit.

His return marks the end of the Phase 1 shuttle-Mir program that has paved the way for the International Space Station and provided valuable lessons in long-duration space flight. Thomas is among seven U.S. astronauts who spent a total of almost 1,000 days aboard Mir.

Packing was no small task for Thomas. A total of 33 bags are to be returned to Earth on *Discovery*. They include U.S. science hardware, scientific samples, video, still film, tools used on space walks and Thomas' personal effects.

As with any move of that magnitude, Thomas found it a good idea to start packing early. With about two weeks left on Mir, he already had completed packing five bags and partly packed 15 others.

In the midst of that job, he had to stop to do some unpacking. With Mir 25 Commander Talgat Musabayev and Flight Engineer Nikolai Budarin, he worked to unload the Progress M-40 resupply ship which recently had docked to Mir. Among items on the Progress were letters and photos from Thomas' family, compact disks, a novel, candy and other personal items.

The vehicle also carried water, fresh food, fuel and scientific hardware for the space station as well as personal items for the Russian crew members.

Thomas found time to write another open letter home, his fifth. The topic was the view

from space, and much of the letter was devoted to descriptions of the fascinatingly beautiful Earth below—its natural and human-made features—and the night sky above.

"One of the most readily visible signs of human presence, is the occurrence of contrails from aircraft in the upper atmosphere," Thomas wrote. "These are crystals of ice formed from water, a byproduct of the combustion process in the aircraft engines, and which is collected into the wake vortices of the aircraft.

"They are very long lasting, and can be seen over virtually all parts of the world as white streaks across the sky. They can be striking around cities that are major air traffic hubs, and can oftentimes be seen radiating out from these cities, like spokes in a wheel."

Thomas has been wrapping up his scientific investigations. They are a continuation of

27 studies in areas of advanced technology, Earth sciences, human life sciences, micro-gravity research and International Space Station risk mitigation.

As his stay drew to a close, Thomas focused on the Biotechnology System Co-Culture experiment growing three-dimensional cultures of cancer cells. The experiment will continue through the end of Thomas' mission, and be transferred to *Discovery* for return to Earth.

Thomas also has photographed changes on the Earth's surface. Some of the changes were seasonal, but others, fires in Mexico and Central America and widespread smoke from them, were caused by humans.

"As I write this, there are huge areas in Central America that are burning. A giant pall of smoke is blanketing the entire south western peninsula of the North American continent and is being carried in the winds over much of the United States and as far north as Canada."



## Astronomers find 'planet' with Hubble

NASA's Hubble Space Telescope has given astronomers their first direct look at what is possibly a planet outside our solar system—one apparently that has been ejected into deep space by its parent stars.

The discovery, made by Susan Terebey of the Extrasolar Research Corporation in Pasadena, Calif., and her team using Hubble's Near Infrared Camera and Multi-Object Spectrometer, further challenges conventional theories about the birth and evolution of planets, and offers new insights into the formation of our own solar system.

Located in the sky within a star-forming region in the constellation Taurus, the object, called TMR-1C, appears to lie at the end of a strange filament of light that suggests it has apparently been flung away from the vicinity of a new pair of binary stars.

At a distance of 450 light-years, the candidate protoplanet would be 10,000 times less luminous than the Sun. If the object is a few hundred thousand years old, the same age as the new star system, then it is estimated to be 2-3 times the mass of Jupiter.

Hubble researchers estimate the odds at 2 percent that the object is instead a chance background star.

"If the results are confirmed, this discovery could be telling us gas giant planets are easy to build. It seems unlikely for us to happen to catch one flung out by the stars unless gas giant planets are common in young binary systems," Terebey said.



NASA Photo 98-04116  
**SIBERIAN SIM—Astronaut Bill Shepherd, right, commander of the first crew that will live aboard the International Space Station, exits a mock Soyuz spacecraft while Cosmonaut Sergei Krikalev, left, flight engineer for the first crew, looks on. The crew, which also includes Cosmonaut Yuri Gidzenko as Soyuz Commander, was participating in Soyuz winter survival training in March 1998 near Star City, Russia.**

## JSC founding member of Astrobiology Institute

JSC is one of 11 academic and research institutions that will be the initial members of NASA's new Astrobiology Institute as the agency launches a major component of its Origins Program.

The electronic "virtual" institute will bring together astrophysicists, biologists, chemists, physicists, planetologists and geologists to conduct interdisciplinary research on the multifaceted issue of life in the universe and its cosmic implications. It also will help to train young scientists in this emerging field.

"These initial members of NASA's Astrobiology Institute will be at the forefront of the increasingly important link between astronomy and biology, which has been a fundamental interest of mine for the past several years," said NASA Administrator Daniel S. Goldin. "The 'office hallways' of this virtual institute will be the fiber optic cables of the Next Generation Internet, and the groundbreaking research that this group generates will help guide our space exploration priorities well into the 21st century."

The initial members are: Ames Research Center, JSC and NASA's Jet Propulsion Laboratory; Harvard University, Cambridge, Mass.; University of California, Los Angeles; University of Colorado, Boulder; Arizona State University, Tempe; Pennsylvania State University, University Park; Carnegie Institution, Washington, D.C.; The Scripps Research Institute, La Jolla, Calif.; and Woods Hole Marine Biological Laboratory, Woods Hole, Mass.

NASA has developed the Origins Program with its Office of Space Sci-

ence to search for signs of life in the universe. Funding for the institute will begin with \$9 million in 1999 and \$20 million in 2000.

Members will conduct a broad range of research on topics including: the formation of organic compounds important to the origins of life, such as from meteorites; the formation and characteristics of habitable planets; the emergence of self-replicating systems and possible pre-biotic worlds; how the Earth and life have influenced each other over time, including the evolution of ancient metabolism and the interplay of evolved oxygen; the evolution of multicellular organisms and the evolution of complex systems in simple animals; organisms in extreme environments such as hydrothermal vents; and the identification of biomarkers to determine terrestrial and extraterrestrial signatures.

JSC's principal investigator for the institute will be Dr. David McKay of the Space and Life Sciences Directorate, who in August 1996 led a team of researchers that found evidence of possible ancient life on Mars by studying a meteorite found in Antarctica. Working closely with McKay will be researchers at the University of Houston and his co-investigators from that project, Dr. Everett Gibson and Kathie Thomas-Keprta of Lockheed-Martin.

The JSC team will concentrate on identifying "biomarkers" that can be used to prove whether biology has been or is present in material samples, and to design methods for comparing them to Earth biomarkers and nonbiological markers that resemble true biomarkers.

## Nobel physicist to use STS-91 instrument to search for elusive dark matter, antimatter

The Alpha Magnetic Spectrometer combines organizations around the world, top international scientists and a synergistic effort by NASA and the Energy Department in research aimed at better understanding the creation and evolution of our universe.

AMS is being taken into space for the first time in *Discovery's* cargo bay on STS-91. After scientists see how the concept works and the hardware and operations are checked out, the detector is scheduled to spend about three years on the International Space Station.

It is the first high energy particle detector to fly in orbit.

"The theory," said John O'Fallon, director of the Division of High Energy Physics in the U.S. Department of Energy, "is that at the time of the Big Bang—the beginning of our universe—matter and anti-matter existed in equal amounts. Our world is made up of matter. So far, we haven't found the anti-matter and we need a new way of looking. That new way is the AMS."

High energy particles, "cosmic rays," were produced at the begin-

ning of the universe. They also come from supernovae and black holes. Ground-based cosmic ray experiments, begun in the 1930s and 40s, have shown that a wide variety of particles rain down on Earth from space. They may include the particles AMS seeks, but the atmosphere scatters and absorbs them.

Particle accelerators produce and control such particles, and have brought about remarkable discoveries. AMS, a 3 1/2-ton detector put together by a scientific team representing 37 research institutions and headed by Nobel laureate and Massachusetts Institute of Technology professor Samuel Ting, uses technology developed by high energy physicists.

"Professor Ting has done a spectacular job of creating, organizing and leading the AMS international team," said O'Fallon, whose department provides more than 90 percent of federal support for U.S. high energy physics research.

"He started this project with only a vision and a concept, and then put together an international collaboration with countries from around the

world to build the AMS detector, all in a very short time."

The team wants to answer two basic questions in their search for antimatter and dark matter:

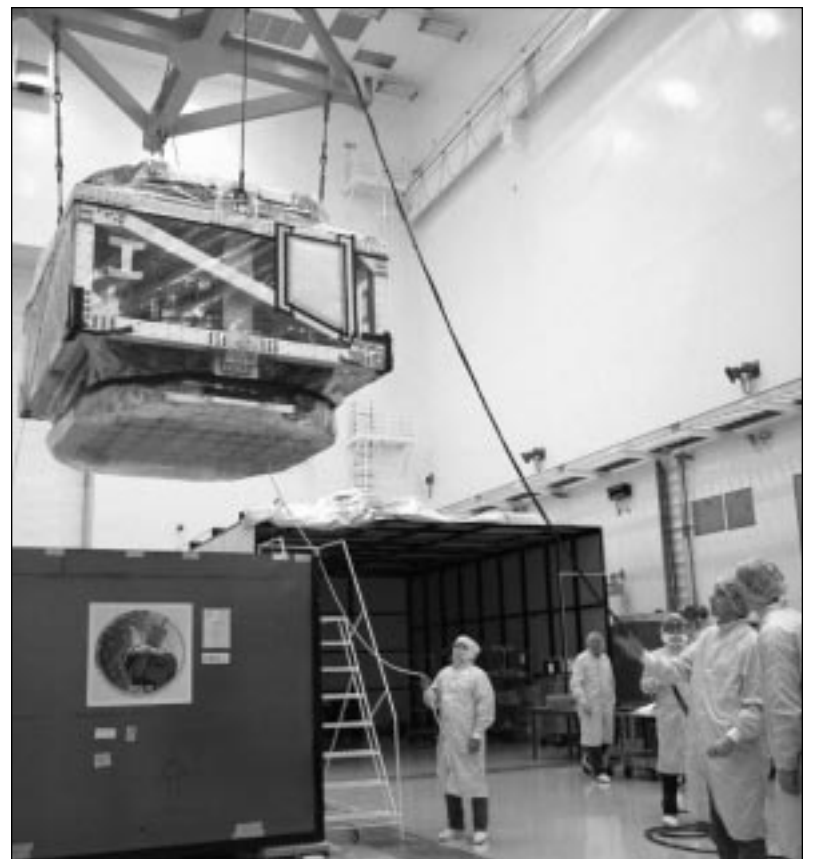
- If, under the Big Bang scenario, equal amounts of matter and antimatter were produced, and the galaxies we now see are made only of matter, where has the antimatter gone?

- Since the mass of a galaxy seems to be greater than the visible mass of all its stars, gas and dust, is there dark matter of a new kind that has not yet been discovered?

Answers from AMS may help scientists better understand the basic building blocks of matter and the forces through which they interact.

O'Fallon cited NASA for working with DOE to make the AMS project, with its aggressive schedule, a success.

"This project has brought together DOE and NASA in a very synergistic way," he said, "the best scientists and engineers from NASA working with top high energy physicists from around the world. Both agencies are needed to carry out the project."



NASA Photo  
**Technicians help move the Alpha Magnetic Spectrometer from its protective shipping case in Kennedy Space Center's Multi Payload Processing Facility. The STS-91 payload arrived at KSC in January and will be used on STS-91 to search for anti-matter and dark matter in space.**



## Community News

### Sun powers local students to state win

*Seabrook students overcome cloudy skies, take winning solar models to San Antonio*

By Kelly Humphries

One of the big lessons learned in this year's solar-powered model cars race at Ed White Elementary School in Seabrook was that things don't always go as planned, everyone needs to be able to adapt.

This was the third year for the "Solar 500" race, supported by a number of JSC volunteers. The top two teams from the Seabrook challenge ended up winning the top two places in the statewide competition held May 16 in San Antonio, said Mike Ewert, one of several JSC civil servants and contractors who helped the fifth-grade students, design, build and run their cars in the school parking lot.

"The nerve-wracking thing about this year was we had clouds that day and we couldn't decide whether to try and do the race or not," Ewert said. "We decided to go for it. The first couple of races were pretty slow, but by the end of the race the cars were zipping along."

"Speedy Split-Second," the car fielded by Mrs. Tammy Oldani's class, won the Seabrook race. On its heels were second-place finisher "The Hearse," and third-place finisher "Grease Lightning." Each car is built by a team of about three-four students.

"For the second year in a row, the winning students from Ed White Elementary went on to statewide competition in San Antonio. This year, they won the top two places," Ewert said.

The race, which is 500 inches long, was dubbed the "Solar 500" three years ago by Cindy Cross, who is from Indiana, the home of the Indianapolis 500. Along with Cross and Ewert, both of Engineering's Crew and Thermal Systems Division, this year's volunteers included Scott Askew, of Engineering's Automation, Robotics and Simulation Division; Elizabeth Kluksdahl and Scott Lazaroff of Engineering's Energy Systems Division; and contractors Dave Oswald of Hamilton Standard, John Schipper of Lockheed and David Bergeron of GB Tech. Also helping out this year were coop Erik Olsen and vocational education student Michael Nguyen.

"From comments the teachers made, they (the students) get a lot of confidence from being able to create something and seeing it run," Ewert said. "We go in trying to teach them a little about solar energy, teamwork and engineering design and they learn some real-world experiences



**Top left: JSC volunteers Scott Lazaroff, left, and David Bergeron watch the "Solar 500" model car races as an Ed White Elementary School student celebrates. Top right: Cindy Cross, left, and Scott Lazaroff witness another finish-line celebration. Above: Scott Askew helps a student make a last-minute starting line repair.**

like when things don't work out as they planned they have to adapt."

The innovative educational project, called "Solar Power-Up," was cosponsored by the Texas Solar Energy Society and the JSC Education Outreach team. The Solar Energy Society provided solar photovoltaic panels, motors, gears and other parts for the cars, while JSC provided volunteers who helped the students learn about teamwork, aerodynamics, friction, solar power and other engineering lessons. Parents, teachers and students all praised JSC's involvement in the project, Ewert said.

"We enjoy it," Ewert added, "the solar volunteers that have done it for several years

and other people who joined it for the first time this year. Three of us—Cindy, Erik and I—actually went to San Antonio this year."

The curriculum is designed to teach the students to work in design teams, make group decisions about the engineering problems they encounter, build the model and present details of what they learned to fellow students, teachers and parents.

As the use of solar panels spreads to such common applications such as calculators and crosswalks, organizers hope to introduce students at participating schools to solar power technology and engineering principles.

### Inspection 98 aims to share with community



JSC once again will share the breadth and depth of its work with thousands of industry, business, community, and education leaders when Inspection 98 is held October 14-16.

"This is a terrific opportunity for us to showcase our JSC facilities and technologies," said Kathy Jurica, this year's event chair.

At Inspection 98, JSC will invite thousands to explore the technologies, facilities, and capabilities used to lead the nation's human space flight program. Forums will explain how to use NASA technologies to meet regional and national challenges.

JSC employees will have the opportunity to draw from the experience of the broader community for innovative approaches to their own challenges, and identify areas where partnerships could be mutually advantageous.

The Inspection 98 office staff includes Jurica, Deputy Chairs Robbie LaBrier and Bobbie Gail Swan, Office Manager Rene Hasson and Team NASA Representative Joe Mayer.

Points of contact from every JSC organization will lend support: AH/Stephen Wiggins; AI/Carroll Dawson, AJ/Lupita Armendariz, AP/Steve Nesbitt, AQ/Leon Blum, BA/Donna Blackshear-Reynolds, CA/Pat Forrester, DA/Terry Gobert, EA/Julie Kramer, GA/Scott Morris, HA/Hank Davis, JA/Ginger Gibson, LA/Cathey Lamb, MA/Joan Baker, NA/Stacey Menard, OA/Lois Lenox, RA/Ray Melton, SA/Melody Anderson, TA/Mike Van Chau, XA/Mary Chesler, and YA/Lindy Fortenberry.

Several committees have been established and already are working to address all of the details. The established committees with their chair are: Audience Development and Publicity, Doug Peterson; Content and Exhibits, Stacey Menard; Registration, Dorothy Rasco and Mary Chesler; Mailings/Programs, Donna Blackshear-Reynolds; Other NASA Centers/Industry, John Stanford; Follow Through, Hank Davis; Hospitality, Lupita Armendariz; Information Technology, Scott Morris; Logistics, Ginger Gibson; Printing/Graphics, Peggy Wooten; Speakers/NASA Alumni, Day-of-Event/Volunteers and Hosts, Natalie Saiz and Mike Kincaid.

To have a successful event, the participation of every employee is needed. Employees who would like to participate on a committee or volunteer to help their organization should contact their directorate/office point-of-contact. Look for the Inspection 98 web page at: <http://inspection.jsc.nasa.gov>. The internal web page is at: <http://www4.jsc.nasa.gov/inspection/>.

For information by more conventional means, call the Inspection 98 office at x41316.

## JSC Safety Alert

### Barriers and Warnings

#### What Happened

An unauthorized person opened a gate marked with an "Authorized Personnel" sign during an on-going operation of a training system. This unauthorized entry could have resulted in injury to personnel or an interruption of training. Warning signs and barriers are used to prevent personnel from entering controlled areas where hazards exist.

#### Outcome of the Investigation

The training areas are frequented by many personnel. Warning signs and barriers are often ignored.

#### What You Can Do

Access to controlled areas should be coordinated with operations personnel and control offices. Barriers and warning signs should be in place to control access during training and hazardous operations. Everyone is responsible for compliance with warning signs and barriers. All JSC personnel are cautioned to observe all barriers and signs that are put in place for their protection.

### Barrios' Johnson earns Rotary Vocational Excellence Award

Sandy Johnson, president of JSC contractor Barrios Technology Inc., recently received the Vocational Excellence Award at the Rotary District 5890 after being named outstanding business person of the year by the Space Center Rotary.

The award was presented at the district assembly held at the University of Houston Hilton. Johnson's nomination was one of 55 submitted from Rotary clubs throughout the district recognizing individuals who excel in their vocations, have made notable achievements, support their communities and "whose efforts make a difference."

As president and owner of Barrios since 1993, Johnson has demonstrated a commitment to excellence through attention to employees, customers and the community, the nomination said. Johnson was among the original group of stockholders that formed Barrios in 1980 with the awarding of NASA's Flight Design Support Services Contract.

Barrios currently employs some 300

people and provides information technology, space operations, training and configuration management services to the aerospace industry and commercial markets.

As a community leader, Johnson has given countless hours of volunteer support. Barrios has adopted Bay Area



**Johnson**

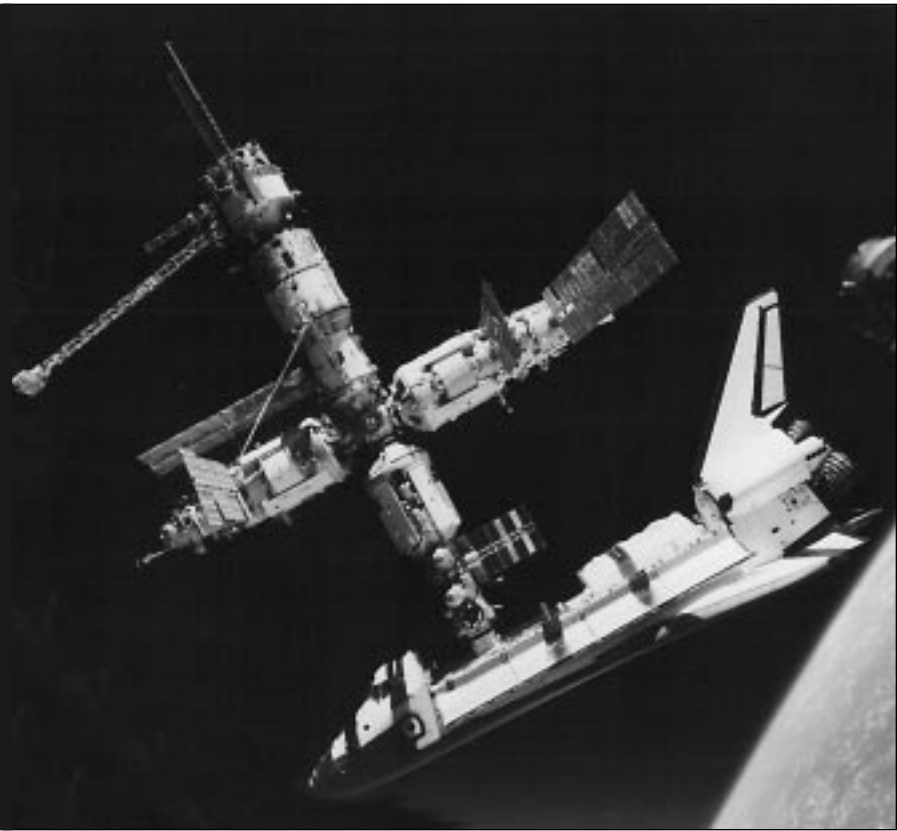
Turning Point, a shelter for battered women and children, and Whitcomb Elementary to enhance the school's math and reading tutoring and mentoring program. Barrios participates in Clear Lake High School's work/study program, and supports many schools during Engineers Week. Barrios also participates in the Adopt a Highway program, providing monthly cleanup of a stretch of NASA Road 1.

She is treasurer for the Clear Lake Area Economic Development Foundation, chair-elect of the Development and Advisory Council for the University of Houston-Clear Lake, and on the board of Spaceweek International and the International Council on Systems Engineering Houston chapter.



# Mission: Possible

## Culmination of shuttle-Mir docking program provides measure of confidence for International Space Station



STS71(s)072

By John Ira Petty

The shuttle-Mir Phase 1 of the International Space Station program has been a time of learning—a time of sometimes unexpected challenges and a time of developing ways to operate in a new environment.

It has been a time of huge accomplishment, of reaping rewards associated with overcoming some of those challenges not known when Phase 1 began.

Challenges met and mastered go far beyond the strictly operational, said Frank Culbertson, director of the shuttle-Mir Phase 1 Program. They also involved learning to overcome cultural and management differences and to mold the ways NASA and its Russian partners did things into a more optimal whole taking the best from both sides.

"When we began the program... we all had very high expectations of what we would learn and what we would experience in Phase 1, particularly of how that would relate to what we would do in future cooperative ventures," Culbertson said. "I believe that we far exceeded those expectations. We had no idea of how much we would learn."

That, he noted, has been true not only in the space program, but in human exploration in general.

### Expectations Exceeded

Phase 1, he believes, met and exceeded those expectations in the quantity and quality of lessons learned by perhaps 10 times.

Randy Brinkley, International Space Station program manager, said he believes remaining ISS challenges will be no more difficult than those that have been overcome during Phase 1. "We have made tremendous progress in terms of understanding one another and being able to work through the various challenges... to building the ISS."

Probably as much has been learned from the

problems on Mir as from the successes, Brinkley said, from working together with Russian partners to understanding and resolving those difficulties safely.

The benefits accrue not only to Phase 1 itself but to design and procedures development for the station. Brinkley said an intangible factor—the development of confidence in one another that grew as we worked together—was at least as important.

"We have learned a great, great deal from Phase 1 and we continue to learn from Phase 1," he said.

Phase 1 manager Culbertson said: "We've been through challenges; we've experienced things we didn't anticipate experiencing; we've learned lessons we didn't know we could learn."

### What's Out There?

That's what Phase 1 was about —"going out and finding out what is out there; going out and finding out how we're going to operate in a new environment on a new station, and then how to do it better and safer."

And that, Culbertson said, is what the International Space Station is about, because it won't be the final answer either. "We're going to be always learning, always looking for new ways of doing business."

Phase 1 has contributed not only to improving the way the partners do things in space, but to the way they relate to one another on Earth, Culbertson said.

Doing these things with international partners focuses people outward, on gathering knowledge and on looking at ways to improve life on Earth as well as on looking at ways to expand human life beyond Earth. Doing that cooperatively rather than in competition "sets an extremely good example for the rest of the world," he said.

Not only information from Phase 1, but also some of its people will provide a foundation for Phase 2, assembly of the International Space Station.

### Station Foundation

People "who can carry their experience, their knowledge, their own lessons learned into the future operations are being transferred into Phase 2," Culbertson said. "We think that's a very important part of what we're doing."

"It's very difficult to imagine beginning Phase 2 without doing what we've done during the shuttle-Mir program," he said. "Getting to know how to operate in space, getting to know how to work with an international partner, getting to understand the Russian way of doing business and the Russians learning the way we do business, has been critical to beginning the (station) operations in space. You're not going to be able to afford the luxury of too many mistakes up there."

It hasn't always been easy. "Sometimes you've got to keep going in the most difficult of circumstances."

Culbertson said he believes a lot of cultural and communications barriers have been overcome. As a result, as Phase 2 begins both partners will have a good operational base and a good understanding of each other. "We'll know how to solve the problems, even if we don't know all the solutions up front. That's one of the main things that Phase 1 has given us, the ability to work on problems together."

### Unprecedented Science

John Uri, shuttle-Mir mission scientist, said Phase 1 has been "a very exciting, very challenging program." On the science side too, a lot of the challenges came at the beginning, as the partners learned to work with one another.

Uri said the scope of Phase 1 "is almost unprecedented in the history of NASA, for conducting a science program of this magnitude over such a short period of time."

Four major science objectives established at the beginning of the program. They were:

- To get engineering and operational experience on a research program on a long-duration space platform. The most recent U.S. experi-

ence had been aboard Skylab in the 1970s. A lot was learned on Mir, and many of the lessons are applicable to the ISS program. "I think that objective has been more than met," Uri said.

- To learn more about Mir and the microgravity environment in general for conducting research programs in various disciplines. "We have certainly done that," Uri said. "It is very feasible to do research on such a platform, which bodes well for the ISS."

- To use Mir as a test bed for space station technologies. "We had a whole program on risk-mitigation experiments, and in some of the science activities we're testing hardware that has been planned or proposed for the ISS," Uri said. Certainly this objective has been met and probably exceeded in a lot of cases."

- To learn how to do space walks with Russian counterparts and systems. One Phase 1 EVA was planned initially. Three were performed. "I believe that objective has been exceeded," Uri said.

During the seven long-duration flights "we've conducted over 100 unique investigations in seven major disciplines, ranging from space science to biomedical to risk mitigation, materials processing," Uri said. They involved 150 principal investigators and many co-investigators from government, universities and the private sector.

Most investigators came from the U.S. and Russia. Others came from Canada, the United Kingdom, Japan, Germany, France and Hungary.

### Eye on the Future

Culbertson said that with international partners, "We have to keep our eye on the future. We have to realize that the Earth is not going to be our only home forever. We need to go beyond it."

"Mir was a really good first step. ISS is a tremendous next step. We'll go far beyond that in generations to come. We can't let those generations down by slacking off or slowing down now." □



S89E5315



S74-E-5117



STS081-343-014



STS071-112-004



# Phase 1 Timeline

Here is a brief overview of the flights that made up Phase 1 of the International Space Station program:

**STS-60** launched Feb. 3, 1994, was the first flight of a cosmonaut aboard the shuttle, Sergei Krikalev as a mission specialist—conducted joint science programs.

**STS-63**, launched Feb. 3, 1995, with Cosmonaut Vladimir Titov aboard, rendezvoused with Mir, closed to within 37 feet and performed a fly-around, but did not dock. Docking equipment was tested for future missions, and communications procedures between the two mission control centers were validated.

**Mir 18** began with the launch of Astronaut Norm Thagard along with Cosmonauts Vladimir Dezhurov and Gennady Strekalov in March 1995. Thagard spent 115 days on Mir. During that time the Spektr science module, with more than 1,500 pounds of research equipment from the U.S. and other countries, was launched to Mir.

**STS-71** was launched with a replacement crew, Cosmonauts Anatoly Solovyev and Nikolai Budarin, on June 27, 1995, and returned Dezhurov, Strekalov and Thagard to Earth.

**STS-74** was the first shuttle assembly flight to Mir. Launched Nov. 12, 1995, it carried a Russian-built, U.S.-funded docking module with two attached solar arrays.

**STS-76** began the continuous U.S. stay on Mir, transporting Shannon Lucid to the station after a March 22, 1996, launch. A single Spacehab module was aboard, demonstrating logistics capabilities. Astronauts Linda Godwin and Rich Clifford placed experiment packages on the Mir's docking module during a space walk.

**STS-79** launched Sept. 16, 1996, included a double Spacehab module. That flight brought Lucid home and replaced her with John Blaha. During Lucid's months aboard Mir, the Priroda module, carrying about 2,200 pounds of U.S. science hardware, was attached to the space station.

**STS-81**, launched Jan. 12, 1997, replaced Blaha with Jerry Linenger. During Linenger's stay aboard the fire of February 1997 occurred, offering new challenges and new information. Linenger conducted the first space-walk by a U.S. astronaut outside Mir wearing a Russian spacesuit.

**STS-84** launched replacement Mike Foale toward Mir on May 15, 1997. Russian Elena Kondakova flew as a mission specialist. The Progress vehicle collision which damaged the Spektr module occurred during Foale's stay—resulting in loss of some science. A remarkable salvage and replanning effort by the science community maximized the scientific return. Foale conducted a space walk with Anatoly Solovyev to survey damage of the Spektr module.

**STS-86**, launched Sept. 25, 1997, picked up Foale and replaced him with David Wolf. Astronauts Scott Parazynski and Vladimir Titov conducted a joint space walk, the first in which a Russian wore a U.S. space suit. Wolf conducted a space walk in January with Solovyev to conduct scientific experiments.

**STS-89**, launched Jan. 22, replaced Wolf with Andy Thomas. The flight also carried Cosmonaut Salizhan Sharipov to Mir.



S79E5095



S79E5277



S79-304-001



STS081-372-035



STS086-334-029



STS086-364-028

## Voice of experience clear on Phase 1's importance

*Seven astronauts spent more than 2 1/2 years aboard the Russian Space Station Mir. More than two years of that time was a continuous U.S. presence in space. Here are some thoughts from the crew members, on a variety of topics.*



### Norman Thagard

On leaving Mir. "This is the way a space station ought to work. You have a space station and a good transport vehicle. Our shuttle has solved some of the shortcomings of Mir space station which was lack of ability to transport things back to Earth at the end of the flight, and the space station has provided another goal and task and job for our space shuttle."

### Shannon Lucid

In a talk from Mir with NASA Administrator Daniel Goldin: "I think we have gained a lot of experience on how to deal with a long flight versus a short flight, which we have so much experience with, and I think we handle very professionally. And I think we've made great strides in how we can operate on the [International] Space Station. So I think this has been a very valuable experience and we've gained a great amount of experience on the flight and the people on the ground and how to work with a flight like this. Frankly, I've learned a lot from being with the Russian crews, ... And it's just been a great experience."

### John Blaha

During his training, shortly before launch. "I think our primary mission is our relationship with the Russians, so working with my two crew mates is the primary mission. The next one of course is my own health and well-being, because that's something to pay

attention to on a long-duration space flight. And after that, of course, to conduct the experiments that we've been trained to conduct up here."

### Jerry Linenger

In a letter to his son after more than 100 days in space: "Space exploration, space colonization in its infancy, is tough. You rely on machines to provide the essentials of life. You are isolated, almost completely; and therefore need to be self-sufficient to a degree that is hard to comprehend. You are surrounded by vacuum, traveling 18,000 mph. Almost every piece of equipment is vital. There is no room for mistakes. You conduct complex experiments in dozens of disciplines, and you are responsible to execute them properly. Your survival depends upon you doing things correctly not once, but every time."

### Mike Foale

At welcome-home ceremonies. "What we're doing, working together, is gluing countries of the world together. Russia has overcome enormous problems in this last four or five months in space, but not alone—with American help. This is an example, not just to our countries, but to others who are participating in our space program and others who might want to in the future, that there are great things for us to do as a planet in space. I hope the children here who see this example, will notice this more than the strife and awful wars that seem to be occurring around the world."

### David Wolf

Looking back: "Agreements can be signed at any level between two countries to cooperate in space. But the actual partnership is based on mutual trust and respect which must be built person to person. Phase 1 has achieved that not just with the astronauts in flight, but with the thousands of people working together—in control centers, the engineers and scientists—to achieve that mutual trust. I don't feel it would have been imaginable to conduct ISS without having developed that trust through the shuttle-Mir program.

"Now we are well-poised to move forward into the International Space Station. In many cases, we've identified and solved the problems in partnership, in both experimental and systems hardware. That will assure much higher productivity in the International Space Station program."

### Andy Thomas

From Mir. "At the beginning of this century, we saw the genesis of powered flight. Some 40 years ago, NASA was begun and our first steps into the cosmos were taken. Since that time we've learned to live and work on a daily basis in space. It's amazing to think what the next 40 years might bring us in terms of space exploration." □



## Ripped from the Roundup

Ripped straight from the pages of old Space News Roundups, here's is what happened at JSC on this date:

### In 1968

Apollo command module 101, scheduled for the first manned Apollo mission, next week will be mated with its service module for manned and unmanned vacuum chamber tests at Kennedy Space Center Manned Spacecraft Operations Building. The command module was delivered to KSC May 30.

Manned vacuum chamber testing at MSC in support of the Apollo VII mission is scheduled to begin next week ... in Chamber A of the Space Environment Simulation Laboratory. Prime crew of the test series are astronauts Joseph Kerwin, Vance Brand and Joe Engle.

### In 1973

The at-first gloomy outlook for Skylab has continued to improve. Engineers, technicians, flight controllers, astronauts and program officials at the NASA Centers and contractor plants around the country have teamed up to trouble-shoot and come up with the right answers and equipment to put the Earth-orbiting space station back on the path to success.

At Roundup press time Pete Conrad and Joseph Kerwin had successfully deployed the solar wing and the solar array panels were beginning to deploy. Telemetry indicated that the solar panels were generating the much needed electric power or a successful Skylab mission.

### In 1983

NASA, long seen as a model for the government in fiscal and personnel management, is now pushing as one of eight major goals to become a government leader in productivity enhancement, management practices and the application of advanced technologies.

The effort will include bringing more employees into the decision-making process, setting up employee teams similar to quality circles in the private sector, promoting more office automation and providing a creative environment for employees.

The Productivity Improvement and Quality Enhancement (PIQE) Program ... calls for a voluntary and largely decentralized effort on the part of management and employees at each of the NASA centers.

### In 1988

Six new Strategy Initiatives Teams are taking a closer look at JSC Strategic Game Plan issues that cross organizational boundaries, and they will recommend actions to the Senior Staff Strategy Team early this month.

JSC Deputy Director Paul J. Weitz said most of the 18 issues in question need to be resolved through joint actions of several JSC organizations.



JSC Photo S98-06930 by Hector Gongora

Employee Activities Association Vice President for Athletics **Bob Musgrove, center,** and **Gilruth Center Recreation Director Eddy Rodriguez, right,** check out the progress of G&Z contractor on two new outdoor sand volleyball courts at the recreation center.

## Sand volleyball comes to JSC

*Gilruth Center digs in to build regulation outdoor court*

By **Bob Musgrove**

JSC's Gilruth Center has teamed up with G&Z contracting to build two lighted sand volleyball courts.

These two regulation-sized sand volleyball courts, located on the south side of the Gilruth—between the gym and the old pavilion—were scheduled to open by the end of May. Construction began May 8. Each court is 26 1/2 feet wide by 59 feet long, with a 10-foot free zone around the boundary line.

In addition to "open play," plans are in work to offer outdoor tournaments and leagues starting this summer, including mixed, women's, and men's, in both competitive and

recreation levels.

Complementing the Gilruth Center's indoor volleyball programs, these new sand volleyball courts will provide the flexibility for teams of six, four, and even two players to compete in a relaxed atmosphere.

"Volleyball players looking for a top-notch facility to use for both competitive and recreational play can now turn to the Gilruth Center year-round," said Eddy Rodriguez, Gilruth recreation director.

For more information on upcoming leagues, tournaments, and court availability, call the Gilruth Center's recorded information line at x33345.

## Earth Day tournament yields trees for future of Gilruth Center

JSC employees can expect to enjoy more shade around the Gilruth Center softball fields as seven newly planted trees grow taller in the years to come thanks to the first annual Earth Day Softball Tournament held in April.

After a one-week delay due to rain, five JSC teams eagerly gathered for an exciting round-robin tournament that provided recreation for the players, and new trees for the Gilruth Center.

The new trees were purchased with fees

donated by the participating teams and through a donation by Wolfe Nursery.

The "Tequila Slammers" softball team, managed by Bob Musgrove, swept the tournament, and took home Earth Day T-shirts and Moody Gardens tickets.

For more information on upcoming events, please contact the Gilruth Center at x33345, or check out the Gilruth Home page at: <http://www4.jsc.nasa.gov/ah/ExcEAA/Gilruth/Gilruth.htm>

## United Way offers help to employees

From his voice on the phone, it was clear that he was desperate. The man calling the Bay Area United Way Helpline needed assistance for his wife of 23 years who was battling cancer. One of the stresses of coping with her illness was coming from the workplace—his employer was beginning to pressure him about work left undone when he took his wife for chemotherapy treatment three days a week. He had no family to help and nowhere to turn.

This was just one of the 300 calls received on average each month by the Bay Area United Way Helpline. Many have similar personal stories—most not as touching and complex, but all of them seeking help. The Helpline is among the many programs provided to the community at the United Way Service Center of the Bay Area. The United Way of the Texas Gulf Coast provides office space to support 20 agencies that have satellite locations based at the center.

The United Way Service Center of the Bay Area is governed by a 15-member advisory board, with members of the JSC community participating. The board oversees the daily activities of the center and offers guidance for operations based on first-hand knowledge of Bay Area needs. Many JSC employees support the service center through their donations to the Combined Federal Campaign.

The agencies currently in the United Way Service Center include:

American Red Cross, Disaster relief, first aid, CPR and non-emergency medical transportation; Associated Catholic Charities, counseling; Bay Area Rehabilitation Center, rehabilitation and therapy services; Bay Area Council on Drugs and Alcohol, counseling for drugs or alcohol abuse; Big Brothers and Sisters of Houston, one-to-one friendships between adult volunteers and a children; Boy Scouts of America, Sam Houston Area Council; Consumer Credit Counseling Service, budget and debt management counseling; Crisis Intervention of Houston, crisis intervention and suicide prevention; Crossroads, Community Partnership for Youth, adult volunteers to befriend troubled youths; DePelchin Children's Center, comprehensive mental health and social services; Ed White Memorial Youth Center; GED and pre-employment training; Family Service Center, counseling; Harris County Health Department, immunizations; Innovative Alternatives Inc., mediation for crimes or disputes; Literacy Advance of Houston, reading, writing and communications volunteers; MHMRA, employment services to mentally retarded adults, counseling and independent living skills classes; Neighborhood Centers Inc., Senior Center; day activity for the elderly; San Jacinto Girl Scout Council; Sheltering Arms, enables elderly to live with dignity and independence in their own homes; United Way Helpline, links people in need with services; and The Volunteer Center, develops, supports and promotes volunteering.

For more information, call 282-6000. If you need help or know of someone who needs help, call the United Way Helpline at 282-6043.

As for the man whose wife had cancer, he used the American Red Cross transportation program to get his wife to and from M.D. Anderson. She has recovered and is doing well.

## Gilruth Center News

**Hours:** The Gilruth Center is open from 6:30 a.m.-10 p.m. Monday-Thursday, 6:30 a.m.-9 p.m. Friday, and 9 a.m.-2 p.m. Saturday.

**Nutrition intervention program:** Six-week program includes lectures, a private consultation with the dietitian and blood analysis to chart your progress. Program is open to all employees, contractors and spouses. For more information, call Tammie Shaw at x32980.

**Defensive driving:** One-day course is offered once a month at the Gilruth Center. Pre-registration required. Cost is \$25. Call for next available class.

**Stamp club:** Meets every second and fourth Monday at 7 p.m. in Rm. 216.

**Weight safety:** Required course for employees wishing to use the Gilruth weight room. The next classes are scheduled for at 8 p.m. June 11 and 25 (must be on time to receive credit for class). Pre-registration is required. Cost is \$5. Annual weight room use fee is \$90. Additional family members are \$50.

**Exercise:** Low-impact class meets from 5:15-6:15 p.m. Mondays and Wednesdays. Cost is \$24 for eight weeks.

**Aikido:** Introductory martial arts class meets from 5:15-6:15 p.m. Tuesday and Wednesday. New classes begin the first of each month. Instruction is by a fourth-degree black belt. Learn to defend yourself and get a great aerobic workout. Cost is \$35 per month.

**Step/bench aerobics:** Low impact cardiovascular workout. Classes meet from 5:15-6:15 p.m. Monday, Tuesdays and Thursdays. Cost is \$32 for eight weeks. Call Kristen Taragzewski, instructor, at x36891 for more information.

**Yoga:** Low impact stretching exercises expertly designed for people of all ages and abilities in a Westernized format. Classes meet Thursdays from 5-6 p.m. Cost is \$32 for eight weeks.

**Ballroom dancing:** Classes meet from 7-8:15 p.m. Thursdays for beginner advanced classes and from 8:15-9:30 p.m. for beginner-intermediate and intermediate students. Cost is \$60 per couple.

**Country and western dancing:** Beginner class meets 7-8:30 p.m. Monday. Advanced class (must know basic steps to all dances) meets 8:30-10 p.m. Monday. Cost is \$20 per couple.

**Fitness program:** Health Related Fitness Program includes a medical screening examination and a 12-week individually prescribed exercise program. For more information call Larry Wier at x30301.

**Gilruth Home Page:** Check out all activities: <http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

## Ticket Window

Bldg. 3 Exchange Store hours are 7 a.m.-4 p.m. Monday-Friday.  
Bldg. 11 Exchange Store hours are 9 a.m.-3 p.m. Monday-Friday.

For more information, please call x35350.

The following discount tickets are available at the Exchange Stores:

General Cinema Theaters	.....\$ 5.50
Sony Loew's Theaters	.....\$ 5.00
AMC Theaters	.....\$ 4.75
Astroworld One Day Admission	.....\$24.25
(valid at all Texas Six Flags Theme Parks)	
Astroworld Season Pass	.....\$57.75
(valid at all Texas Six Flags Theme Parks and Water World)	
Moody Gardens (2 of 6 events)	.....\$ 9.75
Sea World	.....adult \$27.25 ... child (3-11) \$18.25
Schiltterbahn	.....adult \$20.75 ... child (3-11) \$17.50
Space Center Houston	.....adult \$10.25 ... child (4-11) \$ 7.00
JSC civil service employees free.	
Splashtown Water Park	.....adult \$14.50 child (under 48") \$11.50

Metro Tokens and value cards available.  
Houston Comets tickets on sale now in Bldg. 11.

### EAA Events:

Galveston Outdoor Musicals	price:	.....adult \$14.00 .. child (12 & under) \$9.00
Cinderella	.....	June 26
Grease	.....	July 17
Hello Dolly	.....	August 7
Anything Goes	.....	August 28



## Turner new president for United Space Alliance

Russell "Russ" Turner, vice president and general manager of Boeing's Rocketdyne Power and Propulsion, is the new president and chief executive officer of United Space Alliance, replacing Paul Smith, who retires, effective June 15.

Turner, who arrived at USA at the end of May to begin the transition, comes to USA following 11 years with The Boeing Company, most recently at Rocketdyne overseeing key programs including space shuttle main engines, Atlas propulsion, Delta, X-33 launch vehicles, power systems, divert attitude control propulsion, advanced propulsion and power, lasers, and related electro-optical applications.

"His experience and contributions on the space shuttle program make Russ an outstanding choice to lead USA into the future," said Jim

Albaugh, president of Boeing Space Transportation. "He is an innovative executive with in-depth knowledge of the shuttle orbiter and great leadership skills," he added.

Prior to taking the reins at Rocketdyne, Turner was vice president and general manager of Re-usable Space Systems for Boeing, where he was responsible for the overall management and performance of such programs as space shuttle and the ISS crew return vehicle.

Turner served in a number of significant positions with Reusable Space Systems including director of engineering systems, director of information management, vice president and program director of the space shuttle and program director of space shuttle upgrades. Turner also led the Boeing effort to form United Space Alliance in 1996.



Turner

## Cox earns distinguished grad honors at University of Texas

Ken Cox, assistant to the director of Engineering, has been selected as one of five University of Texas at Austin distinguished graduates of the College of Engineering for 1998.

Cox will be recognized at the college's graduation ceremony Saturday. This is the highest recognition that UT's College of Engineering can bestow on an alumnus.

Cox earned his bachelor's degree in 1953 and his master's degree in 1956 from UT, and served as an instructor in the Department of Electrical Engineering from 1955-58. He joined NASA's Manned Spacecraft Center in

Houston in 1963. He was technical manager for the Apollo digital control systems, including the command, service and lunar modules. He earned a doctorate in electrical engineering from Rice University in 1966. He also served as space shuttle technical manager for integrated guidance, navigation and control systems in 1974, and became chief of the Avionics Systems Division in 1987.

Cox earned the AIAA Mechanics and Control of Flight Award in 1971, the NASA Medal for Exceptional Engineering Achievement in 1981, and the AIAA Digital Avionics Award in 1986.



Cox

## People on the Move

*Human Resources reports the following personnel changes as of May 23:*

### Key Management Assignments

Bill Boyd was selected as chief, Energy Systems Test Branch, Energy Systems Division, Engineering Directorate.

### Additions to the Workforce

Mary Kirby joins the Business Management Directorate as a program analyst.

### Reassignments Between Directorates

David Bell moves from the Office of the Chief Information Officer to the Space and Life Sciences Directorate.

Rob Suggs moves from the International Space Station Program Office to the Space and Life Sciences Directorate.

## Personality Profile



JSC Photo S98E5054 by Mark Sowa

JSC cafeteria manager Harry Conran takes pride in helping select the best quality ingredients for the dishes he and his staff prepare for employees and visitors.

## Full steam ahead

*After ships, airports cafeteria manager still finds JSC work challenging*

By Lori Keith

In the food service business since 1948, Harry Conran has served or prepared food for Irish airports, British ships at sea, and NASA astronauts. He started out at Shannon Airport in Ireland, then moved to England and the passenger liners Queen Elizabeth, Queen Mary and others.

Conran, manager of the NASA-JSC Exchange cafeterias in Bldgs. 3 and 11, has spent the past 29 years at JSC making sure all employees and visitors have nutritious, satisfying meals in the on-site cafeterias.

His job is to oversee the daily operations, making sure they run smoothly, and to ensure the proper amount of food is prepared daily. He also is responsible for purchasing all food stuffs required. His hand is in the menu planning, too, which is done on a six-week revolving cycle.

"We also have a dietitian, who comes from the Rec Center," Con-

ran said, "who helps us with total health in planning meals."

The cafeterias are open Monday-Friday serving breakfast from 7-10 a.m., and serving lunch from 11 a.m.-2 p.m. Their busiest time is from 11 a.m.-12:30 p.m. "This is when it is full steam ahead in the cafeteria," Conran comments.

Conran explains the goal of the cafeteria is to provide a large assortment of good wholesome food, while taking into consideration the cost of providing it. Conran estimates that the cafeterias combined serve a total of about 1,800 people a day.

"Our most popular dishes are fried chicken, spaghetti and meatballs, chicken fried steak and our Mexican special—which includes beans, rice, cheese enchiladas and a tossed salad," Conran said, explaining that over the years people's tastes have changed, as more people are calorie and fat conscious. Yet these American mainstays are still favorites.

He is extremely proud of the cleanliness of their kitchens. "We invite anyone to come in and walk in our

kitchen, anytime," Conran said. "Cleanliness is very important here, at all times." The walk-in coolers are even spotless, and many a salesman has commented on their cleanliness, according to Conran.

The average cost of a meal is \$4, with the daily special running \$3.70. The daily special includes a meat entree, two vegetables, roll with butter and a drink.

Conran was born and reared in Ireland. He married his wife of 43 years in London where they had three children, and he worked for the American Embassy. He also spent two years in Australia.

The busiest times of year for the cafeterias usually are during Open House, Inspection Day and Safety Day.

"Most people are off on Safety Day, but we are still slugging away back there," Conran said.

"We have been considered the best NASA cafeteria or food service that there is, no one compares," Conran said. "At least this is what I have been told many times."

## Mission Control open to workers, families during STS-91

The Mission Control Center viewing room will be open for JSC and contractor badged employees and their families during STS-91.

Assuming an on-time launch, Employees may visit the MCC: Today — 3-5 p.m.

Saturday — 1-3 p.m.

Sunday — 5-7 p.m.;

Monday — 5-7 p.m.;

Tuesday — 11 a.m.-1 p.m.;

Wednesday — noon-2 p.m.; and

Thursday — 11 a.m.-1 p.m.

Employees must wear their badges

and escort family members through the lobby of Bldg. 30 South. Children under five will not be permitted. No cameras or loud talking will be permitted at any time. For the latest schedule, call the Employee Information Service at x36765.

## Dates & Data

### June 9

**Aero club meets:** The Bay Area Aero Club will meet at 7 p.m. June 9 at the Houston Gulf Airport clubhouse at 2750 FM 1266 in League City. For more information, call Larry Hendrickson at x32050.

**NPMA meets:** The National Property Management Association will meet at 5 p.m. June 9 at Robinette and Doyle Caterers, 216 Kirby in Seabrook. Dinner costs \$14. For details, call Sina Hawsey at x36582.

### June 10

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. June 10 at the House of Prayer Lutheran Church. For more information, call George Salazar at x30162.

**Communicators meet:** The Clear Lake Communicators will meet at 11:30 a.m. June 10. For information and location, contact Henry Duke at 280-4403 or Melissa Sommers at 332-0698.

**Spaceteam Toastmasters meet:** The Spaceteam Toastmasters will meet at 11:30 a.m. June 10 at United Space Alliance, 600 Gemini. For details, call Chuck Kubricht at 282-3908 or Brian Collins at x35190.

**Astronomy seminar:** The JSC Astronomy Seminar will meet at noon June 10 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at x35037.

**PSI meets:** The Clear Lake/NASA Chapter of Professional Secretaries International will meet at 5:30 p.m. June 10. For more information, call Elaine Kemp at x30556.

### June 11

**TSU alumni meet:** The Texas Southern University, Clear Lake/Galveston Alumni Chapter will meet at 6:30 p.m. June 11 on the TSU campus in Hannah Hall Room 217. For details, call 281-481-0950 or Janell Ellison at 713-731-0949.

**SSQ meets:** The Society for Soft-

ware Quality will meet at 6:45 p.m. June 11 at the Holiday Inn. Registration and social begin at 5:30 p.m. with dinner at 6 p.m. To make a reservation, call Earl Lee at 335-2322 or Herb Babineaux at x34263.

### June 12

**Space Society meets:** The Clear Lake Area chapter of the National Space Society will meet at 6:30 p.m. June 12 at the Radisson Hotel, 9100 Gulf Freeway, in the Deer Park room. For more information, call Murray Clark at 367-2227.

**Astronomers meet:** The JSC Astronomical Society will meet at 7:30 p.m. June 12 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. For more information, call Chuck Shaw at x35416.

### June 17

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. June 17 at the House of Prayer Lutheran Church. For

more information, call George Salazar at x30162.

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**Scuba club meets:** The Lunarfans will meet at 7:30 p.m. June 17 at the Redfish Restaurant under the Kemah/Seabrook bridge, Seabrook side. For more information, call Mike Manering at x32618.

### June 18

**Child care board:** The Space Family Education board of directors will meet at 11:30 a.m. June 18 in Bldg. 45, Rm. 712D. For more information on this open meeting, call Gretchen Thomas at x37664.

### June 24

**MAES meets:** The Society of Mexican American Engineers and Scientists will meet at 5 p.m. June 11 in Bldg. 45, Rm. 712D. For details, call Gerard Valle at x38835.

### June 25

**Radio Club meets:** The JSC Amateur Radio Club will meet at 6:30 p.m. June 25 at the Piccadilly, 2465 Bay Area Blvd. For more information, call Larry Dietrich at x39198.

### July 3

**Independence Day:** Most JSC offices will be closed July 3 in observance of the July 4 Independence Day holiday.



## NASA Briefs

### Small items can have big education impact

Got any extra 2-liter bottles or paper towel tubes? Here's your chance to "recycle" them for education. The Education and Information Services Branch of the Public Affairs Office is looking for these recyclable items for its summer teacher workshops. The 2-liter plastic bottles will be used for making water rockets and are needed prior to June 15. A variety of materials will be needed by July 2 to show teachers how to help their elementary students build Mars bases. These include, but are not limited to: toilet paper cardboard tubes, paper towel cardboard tubes, plastic covers from food trays, small plastic bottles, 35mm film canisters, straws, plastic cylinders from tape dispensers, leftover green indoor/outdoor carpet strips and cardboard boxes in small or medium sizes. Drop your contributions in the office of the workshop coordinator, Norma Rhoads, Bldg. 2, Rm. 164.

### Solar observer sees magnetic energy

The first images from NASA's Transition Region and Coronal Explorer spacecraft reveal activity in the solar atmosphere in stunning detail and include the first detailed observations of a magnetic energy release, called a magnetic reconnection. The magnetic reconnection was observed on May 8 in a region of the solar atmosphere where two sets of perpendicular magnetic loops expanded into each other. Magnetic reconnection occurs when magnetic fields "snap" to a new, lower energy configuration, much like when a twisted rubber band unwinds or breaks. A magnetic reconnection can release vast amounts of energy and is responsible for explosive events such as flares, that can cause communication and power disruptions on Earth.

### Ships, satellites, planes study Arctic

An ice-breaking ship, research airplanes, space satellites and an international team of scientists are converging in the Alaskan Arctic this month to learn more about global climate change through the study of clouds and radiation of the Sun during the spring and summer. The First International Satellite Cloud Climatology Project Regional Experiment/Arctic Cloud Experiment is studying a variety of cloud systems in a two-phase campaign April 7-June 13 and July 6-30. FIRE is led by NASA, in collaboration with other government and private organizations, and will take place in Alaska in the Beaufort Sea and in the skies over the coastal town of Barrow. "The data from FIRE/ACE will provide the opportunity to greatly expand our knowledge of the Arctic climate—an important component in any global climate change scenario," said Dr. Patrick Minnis, FIRE project scientist.

# Surveyor finds evidence of early Mars water

New mineralogical and topographic evidence suggesting that Mars had abundant water and thermal activity in its early history is emerging from data gleaned by NASA's Mars Global Surveyor spacecraft.

Scientists are getting more glimpses of this warmer, wetter past on Mars while Global Surveyor circles the planet in a temporary 11.6-hour elliptical orbit. Findings from data gathered during the early portions of this hiatus in the mission's orbital aerobraking campaign are being presented at the spring meeting of the American Geophysical Union in Boston.

Among many results, the Thermal

Emission Spectrometer instrument team, led by Dr. Philip Christensen of Arizona State University, Tempe, has discovered the first clear evidence of an ancient hydrothermal system. This finding implies that water was stable at or near the surface and that a thicker atmosphere existed in Mars' early history.

Measurements from the spectrometer show a remarkable accumulation of the mineral hematite, well-crystallized grains of ferric (iron) oxide that typically originate from thermal activity and standing bodies of water and may be responsible for Mars' rusty coloration. This deposit is localized near the Martian equator, in an area approximately 300

miles (500 kilometers) in diameter.

Meanwhile, the Mars Orbiter Laser Altimeter instrument is giving mission scientists their first three-dimensional views of the planet's north polar ice cap. Principal Investigator Dr. David Smith of Goddard Space Flight Center and his team have been using the laser altimeter to obtain more than 50,000 measurements of the topography of the polar cap in order to calculate its thickness, and learn more about related seasonal and climatic changes.

These initial profiles have revealed an often striking surface topology of canyons and spiral troughs in the water and carbon

dioxide ice that can reach depths as great as 3,600 feet below the surface. Many of the larger and deeper troughs display a staircase structure, which may ultimately be correlated with seasonal layering of ice and dust observed by NASA's Viking mission orbiters in the late 1970s.

In addition, the Global Surveyor accelerometer team, led by Dr. Gerald Keating of George Washington University, Washington, D.C., has discovered two enormous bulges in the upper atmosphere of Mars in the northern hemisphere, on opposite sides of the planet. These bulges rotate with the planet, causing variations of nearly a factor of two in atmospheric pressure.



JSC Photo by Hector Gongora

**GUEST VOCALS—JSC Director George Abbey, left, talks with radio talk show host Tom Tynan during the JSC Electrical Safety Fair. Tynan hosts a KTRH Radio program on home improvement, and Abbey and other JSC officials took part in the radio program by way of a live broadcast from the Gilruth Center.**

## JSC looking for American Heritage Week volunteers

JSC is looking for volunteers to help with preparations for the fifth annual American Heritage Week observance July 6-10. This year's theme is "Celebrating the Past, Pioneering the Future."

What started as a one-day celebration presented by JSC civil servant employees in 1994, is now a week-long celebration presented by "TEAM NASA," the ongoing partnership between JSC civil service employees, contractor employees, and the Clear Lake community.

American Heritage Week celebrates the similarities that bring individual members of TEAM NASA together, while simultaneously celebrating the differences through which we learn and grow together.

This year's celebration will include performances throughout the week in the Bldg. 3 cafeteria, and a grand finale July 10 at the Gilruth Center. The finale will offer simultaneous performances in both the ballroom and gym.

Volunteers are still needed for a variety of tasks. To sign up call Pat Burke at x30606. Those who would like to help promote American Heritage Week as Town Criers and dress up in an appropriate costume of their own design should call, June Bennett Larson at x36080. Employees may volunteer as many hours as they wish—or as few as they can spare.

## Russia affirms new station is its top civil space priority

(Continued from Page 1)

son capability is planned in November 2002. And the final launch in the assembly sequence is set for January 2004, only one month later than in the previous assembly plan. Some issues in this assembly sequence remain under review and will be resolved at a Space Station Control Board meeting in September.

NASA continues the development of an Interim Control Module as a contingency against further delays in the Service Module and as a poten-

tial additional propellant capability for a more robust space station. A decision concerning the configuration of the Interim Control Module will be made later this year.

During the heads-of-agency meeting, the Russian Space Agency stated that the Russian government has made the International Space Station its number one civil space priority. RSA noted that progress on the Service Module continues to meet a launch in April 1999.

RSA also is working to deorbit Mir

as early as is safely possible, with a goal of developing a potential to deorbit by July 1999. The international partners expressed their concern with delays to the International Space Station program to date and brought to the attention of RSA that it is critical to all participating nations that the space station program schedule is met.

The agencies' leaders also acknowledged the atmosphere of cooperation, the accomplishments and the successful achievements of

the shuttle-Mir program and said they look forward to the smooth transition to Phases 2 and 3 of the International Space Station. In addition, they highlighted the ongoing International Space Station training currently under way for the first four station crews.

Full details of the current International Space Station Assembly Sequence, Revision D, are available in a NASA fact sheet. The fact sheet may be obtained from the internet at the International Space Station Web at <http://station.nasa.gov>.

## STS-91 marks end of learning period, start of construction

(Continued from Page 1)

flight; while Mission Specialist Wendy Lawrence will be making her fourth flight. Mission Specialist Franklin Chang-Díaz, making his sixth flight, and Mission Specialist Janet Kavandi, on her first flight, round out the astronaut crew. Russian Valery Ryumin will be making his fourth space flight, this one as a shuttle mission specialist.

Precourt, an Air Force colonel, has made two previous visits to Mir. This flight, he said marks the end of the International Space Station's

Phase 1 Program and the beginning of Phase 2, the assembly of the station. For the return trip from Mir, *Discovery* will be joined by Thomas, who went aboard Mir from STS-89 launched last January.

The Phase 1 Program, by maintaining a continuous American presence in space and developing the procedures and hardware required for an international partnership in orbit, has produced priceless lessons in both long-duration space flight and the kind of international cooperation that will be required to build the

international orbiting outpost.

A single Spacehab module will be in *Discovery's* cargo bay, carrying a variety of supplies and equipment to Mir. In addition, astronauts will test a new system called the Spacehab Universal Communication System, or SHUCS, that can be used to send and receive voice commands and faxes, as well as provide video images of the crew from the Spacehab module.

SHUCS will test the improved availability of payload uplink and downlink communications with the

ground. On STS-91, the crew will have scheduled voice and fax contacts that are pre-approved by the Flight Control Team. SHUCS "roundtrip" latency of 0.7 - 1.2 seconds allows file transfer, commanding, up/downlink fax and voice communications globally via three ground stations and four satellites.

Assuming a June 2 launch at about 5:10 p.m. CDT, (within the seven to 10 minute launch window) the landing was scheduled at Kennedy Space Center the afternoon of June 12.

## When address is clear, mail gets there better

JSC's Mail and Distribution Center is seeking help from all employees to increase the efficiency of deliveries around the site and to off-site locations.

With the many recent changes in JSC mail codes, the mailroom suggests that everyone use the on-line telephone book to verify they are using the correct address before they slip their envelope into the "out" box. This simple idea could save several days delay for incorrectly addressed mail. To access the on-line directory, go to: <http://www4.jsc.nasa.gov/>

Employees should remember that mail cannot be delivered by building location. Mail that is not clearly marked with a JSC mail code must be researched to determine the correct

address, often delaying delivery by several days. Employees also should remember to include their mail codes when supplying their JSC address to vendors and other organizations outside of JSC

In another cost-saving measure, the Space News Roundup this issue begins using an automated presorting system for distribution to retirees and other off-site delivery locations. A small blank area at the bottom of Page 8 will be left open for addressing purposes and used by the JSC mail room to address and presort the Roundup. The new addressing equipment, purchased by the IMPASS contract, is expected to allow the center to save a substantial amount of postage costs.

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