

Space News **ROUNDUP!**

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God speed John Glenn, again

John Glenn, the first American to orbit the Earth, will return to space with the STS-95 crew of the Space Shuttle *Discovery*, scheduled to launch in October. Glenn will serve as a payload specialist.

Glenn made history 36 years ago when he strapped himself into a nine-by-seven foot capsule atop an experimental Atlas rocket and became the first American to orbit the Earth. Recently he asked NASA if he could fly again to conduct space-based

research on aging, but only if he met the agency's physical and mental requirements.

"Not only is John Glenn a Marine test pilot, an astronaut, and the first American to orbit the Earth, he brings a unique blend of experience to NASA," said NASA Administrator Daniel S. Goldin. "He has flight, operational, and policy experience. Unlike most astronauts, he never got the opportunity for a second flight. He is a part of the NASA family, an American

hero, and he has the right stuff for this mission."

Glenn, who still flies his own plane, flew 149 missions as a Marine fighter pilot in World War II and Korea, and was hit by enemy fire 11 times. As a test pilot, he set a transcontinental speed record and recently set a record for speed on a flight from Dayton, Ohio to Washington.

"Needless to say, I'm excited to be back and I'm honored and I'm privileged. Please see **GLENN**, Page 8



John Glenn



NASA Photo KSC-98EC-0229

The Space Shuttle *Endeavour* cuts a bright swath through the dark sky as it blazes a trail toward the Russian Space Station *Mir*. *Endeavour* lifted off at its scheduled time of 8:48 a.m. CST Jan. 22.

Thomas arrives aboard Mir; Wolf heads for home

The Space Shuttle *Endeavour* was scheduled to land Saturday at Kennedy Space Center following a successful swap of Astronaut Andy Thomas for Dave Wolf aboard the

Endeavour following the 2:14 p.m. CST Saturday docking.

Wilcutt eased the 100-ton *Endeavour* smoothly into its docking port over southeastern Russia, west

Russian *Mir* Space Station. "Thanks for coming to get me," Wolf told STS-89 Commander Terry Wilcutt as the two embraced after the hatches between the two space ships were opened Jan. 24. "I'm not sure whether I live in Russia, space or America, but I know it's going to be America next."



Wolf, who was a *Mir* crew member for 119 days and will have been in orbit for 128 days by the scheduled landing time Saturday, joined *Mir* Commander Anatoly Solovyev and Flight Engineer Pavel Vinogradov in greeting Wilcutt and the rest of the STS-89 crew - Pilot Joe Edwards, Payload Commander Bonnie Dunbar and Mission Specialists James Reilly, Mike Anderson, Russian Salizhan Sharipov, and Thomas—inside

of Kazakhstan, at an altitude of 246 miles. Through the final phases of the rendezvous, Dunbar exchanged radio greetings with Solovyev, Vinogradov and Wolf.

"You guys look great, this is a lot of fun," Wolf said. "This whole thing is touching me more than I expected, seeing the shuttle."

Astronaut Andy Thomas officially became a member of the *Mir* 24 crew late Jan. 25 and Dave Wolf became a member of the STS-89 crew, but not until a difficulty with Thomas's Soyuz capsule pressure suit could be resolved.

"I see I have an awful lot to learn. I'm sure I'll have a fascinating time," Thomas said during the welcoming ceremony in *Mir*'s Core Module, in which all 11 spacefarers exchanged. Please see **THOMAS**, Page 8

Russia nominates Ryumin for shuttle-Mir mission

The Russian Space Agency has nominated veteran cosmonaut Valeriy Ryumin, Ph.D., to fly as a mission specialist on STS-91, set for a May 1998 launch on *Discovery*.

Ryumin, manager of the Russian Phase 1 *Mir*-Shuttle Program, is training with the STS-91 crew at JSC. He is a space flight veteran, having spent 362 days in space over three missions. He was the

flight engineer on the Soyuz 25 mission, then flew on the Soyuz 32 mission to Salyut 6, spending 175 days there from Feb. 25 to Aug. 19, 1979. Ryumin's last space flight came as a member of the Soyuz 35 mission, on which he spent 185 days in space from April 9 to Oct. 11, 1980.

STS-91 will mark Ryumin's first space shuttle flight and first visit to the *Mir* space station. Already

named to the crew are Commander Charlie Precourt, Pilot Dom Gorie, and Mission Specialists Wendy Lawrence, Franklin Chang-Diaz, and Janet Kavandi.

Mission Specialist Andy Thomas will join the STS-91 crew as he returns from a four-month research mission on *Mir*. Thomas' departure from *Mir* will bring to an end more than two years of a continuous U.S. presence on *Mir*, beginning

with Shannon Lucid in March 1996. Thomas arrived on *Mir* Jan. 24 as a member of the STS-89 crew.

The Phase 1 Program of shuttle/*Mir* dockings is a precursor to the International Space Station, maintaining a continuous American and Russian presence in space and developing the procedures and hardware required for an international partnership in space.

First space station module heads to Russian launch site

By Kari Kelley

This week's journey of a special railroad car carrying the first piece of the International Space Station from a Moscow factory to its launch site in Baikonur, Kazakhstan, marks a major milestone in the construction of the multinational outpost.

This U.S.-funded and Russian-built control module, also known as the FGB, was scheduled to depart the Khruichev factory aboard the rail car Tuesday, beginning a 1,200 mile, five-day train journey to Baikonur, where it will begin five months of launch preparations and final testing.

Representatives from NASA, the Russian Space Agency, Boeing and Khruichev Industries unveiled the FGB flight unit Jan. 17 at the Khruichev manufacturing site in Moscow. The event commemorated the completion of the control module at the manufacturing plant and its readiness for pre-launch testing.

"When the control module arrives at Baikonur, all of the elements for our first two launches will be undergoing final launch processing," International Space Station Program Manager Randy Brinkley said. "The year of the International Space Station begins. Please see **STATION's**, Page 8



Photo courtesy Boeing

The International Space Station control module, or FGB, sits on the manufacturing floor at Khruichev Research Center.

Wolf completes space walk, prepares to come home

U.S. Astronaut David Wolf completed four months of research on the Mir Space Station this past week, awaiting the arrival of *Endeavour* and the transfer of Astronaut Andy Thomas to take his place as the final American to live and work on the Mir.

After wrapping up a mission virtually devoid of systems problems, Wolf capped off his stay on the Mir with a four-hour space walk on Jan. 14 with Mir 24 Commander Anatoly Solovyev. Wolf used a portable spectrometer to measure the degree of wear and tear on Mir's exterior.

Mir's first component, the Core Module, was launched 12 years ago. Wolf measured the deterioration of the exterior surface of the Kvant-2 module during his space walk. Kvant-2

was launched in 1989. The data will be studied by engineers involved in the fabrication of space hardware for future facilities.

"When I was nine years old and Ed White did the first American space walk from a Gemini capsule, I thought that's what I wanted to do. It was worth the 32-year wait," Wolf said. "When you clip that tether on outside and slip on outside the vehicle and see the whole perspective of what's really happening here, this vehicle and the Earth, it goes beyond any expectation."

During his final status report, Wolf summed up what Andy Thomas could expect. "He's in

for the time of his life," Wolf said.

Once he returns to Earth, Wolf will begin several weeks of debriefings and medical rehabilitation as did the five other U.S. astronauts who preceded him on the Mir. Wolf's tenure extended the continuous U.S. presence in space on the Mir to 22 months, starting with the arrival of Shannon Lucid in March 1996. He said he is looking forward to home.

"I miss everything I think of about Earth," Wolf said, "you just realize what a great place it is after you're away from it this long. Of course, when I'm back on Earth I'll miss everything up here, too.

I've got my heart set now on being on Earth," Wolf noted. "But there's a lot to do on our wonderful planet Earth."

Wolf also had a special thanks for everyone at NASA who has helped support his mission.

"This is a wonderful team that we are a part of and it has been a privilege to work with all of you, and to continue to work with all of you as we move into the International Space Station era. There will be difficulties and we will have to attack those problems with the same enthusiasm and energy that we have attacked all the problems in the past. And it will bring out our best, no question. So, see you on Earth, it's been a wonderful flight and a difficult flight and that's the best part of it."



Morgan to join astronaut candidates

NASA has selected Barbara Morgan, an elementary school teacher from McCall, Idaho, to join the next astronaut candidate class as a mission specialist, and she has accepted.

In a decision that re-emphasizes the importance of NASA's commitment to education and its unique position to improve science, mathematics, and technology education, NASA Administrator Daniel S. Goldin said Jan. 16 that it is appropriate to include educator mission specialists in the astronaut corps.

"This is a signal that we're trying to do the maximum space research to benefit the American people and to inspire people," Goldin said. "When we bring people into the astronaut corps, they will be fully trained. One of the issues I personally had with the Teacher in Space Program was the lack of full training. That is why Barbara Morgan is going to become a fully trained mission specialist."

In addition to meeting the astronaut selection requirements, mission specialists with education and teaching backgrounds in science, mathematics and technology will be selected and trained in the astronaut corps. These mission specialists will carry out educational programs in addition to their other flight duties.

NASA has no plans to fly a civilian-observer on the space shuttle. Barbara Morgan has been named to the next class of astronauts and will be the first to train under a new Mission Specialist Educator category. The members of the 1998 astronaut candidate class are scheduled to arrive at JSC this summer.

Morgan was selected as the backup to Teacher in Space Christa McAuliffe in 1985. Following the *Challenger* accident, Morgan was named the Teacher in Space Designee and has worked closely with NASA's Education Office.

In future astronaut selection processes, consideration will be given to candidates who could also be Mission Specialist Educators.

"We are not looking for educators only," Goldin said. "They must be scientists and do science, and then education as part of the process, as with biologists and geologists."



CONGRESSIONAL VISIT—NASA Administrator Daniel S. Goldin visits the X-38 at JSC during a recent congressional visit by Sen. Robert Kerrey, D-Neb., who has been a key player in the congressional debate of the International Space Station. X-38 Project Manager John Muratore briefed the group on the X-38, a JSC designed and built vehicle that will provide assured crew return capability for the International Space Station. Kerrey and members of his staff visited a number of JSC facilities, including the Shuttle Mission Simulator and the Advanced Life Support Test Chamber in Bldg. 7.

Galileo begins extended mission

The Galileo spacecraft last week completed a maneuver to prepare itself for the upcoming Europa encounter on Feb. 10, part of its extended mission to further investigate that planet-sized Jovian moon.

The spacecraft recently began a two-year extended mission, known as the Galileo Europa Mission, which includes a total of eight Europa flybys, four of Callisto, and one or two of Io, depending on spacecraft health.

Galileo also is sending back to Earth high-resolution pictures taken during the Dec. 16 Europa encounter. That flyby was the closest ever to be performed by Galileo, with the spacecraft dipping down to 124 miles above the icy moon's surface. Galileo is returning information on the interaction between Europa and Jupiter's magnetic and electric field environment.

Members of the Galileo flight team are analyzing data from a test performed Jan. 16, which they hope will shed light

on the cause of two recent incidents of unusual behavior by the spacecraft. One irregularity occurred during the spacecraft's Dec. 16, flyby of Europa, and the other after the flyby. Both involved the attitude control subsystem which controls where the spacecraft and scan platform are pointing.

Team members believe the cause may have been one of the spacecraft's two gyroscopes. The gyroscopes are used to point the spacecraft when very precise pointing control and knowledge of the spacecraft's position and orientation are needed, usually for camera and other remote sensing science observations or for maneuvers that adjust the spacecraft's flight path. While the investigation continues, the spacecraft has resumed normal transmission to Earth of pictures and other science information stored on its onboard tape recorder.

The anomalies were not considered serious, but did cause a temporary slowdown in the data rate to Earth.

NASA renames enterprise for Earth Science

NASA last week renamed the Mission to Planet Earth enterprise the Earth Science enterprise to more clearly convey the goals of the program.

The Earth Science enterprise is one of the four strategic enterprises of the agency, responsible for a long-term, coordinated research effort to study the total Earth system and the effects of natural and human-induced changes on the global environment.

"We feel that 'Earth Science' more clearly conveys to the American people the goals of our program, and more directly focuses on the research that we're conducting," Acting Associate Administrator for Earth Science William Townsend said. "1998 will include several major launches in the enterprise, including the first Earth Observing System missions, and we are pleased to enter this era with the new name."

The Earth Science enterprise is pioneering the emerging discipline of Earth system science, with a near-term emphasis on global climate change. Earth science research capabilities under development will yield a variety of new scientific understandings and practical benefits to humankind. The goals of the Earth Science enterprise are to expand scientific knowledge of the Earth system using NASA's unique vantage points of space, aircraft, and in situ platforms, creating an international capability to forecast and assess the health of the Earth system; to widely disseminate information about the Earth system; and to enable the productive use of Earth science results and related technology in the public and private sectors.

The title "Mission to Planet Earth" originated 10 years ago in a report on future directions for the U.S. civil space program by a commission led by former astronaut Dr. Sally Ride. The term and the concept of looking at Earth as NASA looks at other planets were furthered by the 1990 Report of the Advisory Committee on the Future of the U.S. Space Program, prepared by a team of experts chaired by Dr. Norman Augustine. Since that time, NASA has organized its activities into four strategic enterprises, including Human Exploration and Development of Space, Aeronautics and Space Transportation, and Space Science.

NEAR tests instruments on close swing by Earth

NASA's Near Earth Asteroid Rendezvous spacecraft, built by The Johns Hopkins University Applied Physics Laboratory in Laurel, Md., became the first interplanetary spacecraft to be seen with the naked eye when it swung by Earth Jan. 22-23.

The spacecraft's solar panels reflected the Sun's rays onto the Earth in a greeting as it flew by for an adjustment of its trajectory to correctly align the spacecraft for a rendezvous with asteroid 433 Eros, its mission target.

Launched Feb. 17, 1996, NEAR completed a flyby of the asteroid Mathilde in June 1997, then began its return to Earth. The spacecraft zipped past Earth over the Pacific Ocean traveling at about 20,000 mph. NEAR scientists and engineers used the swing-by as an opportunity to test performance and calibration of the spacecraft's six instruments and to practice coordinated multi-instrument observations of the type that will be used at Eros.

NASA commits to second X-34 vehicle

NASA has modified its X-34 contract with Orbital Sciences Corp., Dulles, Va., to produce a second flight vehicle for the X-34 Program.

"The purpose of a second vehicle is to reduce risk to the X-34 program," said deputy program manager Mike Allen of Marshall Space Flight Center. "One of the lessons we learned from the Clipper Graham program is that it is desirable to have a second flight vehicle available, especially if it can be acquired at a relatively low cost." Clipper Graham was a previous technology demonstrator that NASA flew four times in 1996, until it was destroyed during landing.

Under the new arrangement, X-

34 test objectives are being expanded, adding, for example, unpowered tests to the flight profile. A second vehicle also will provide flexibility in demonstrating various technologies, allowing testing that requires repetitive flights to continue at the same time as tests which require significant, time-consuming changes to the vehicle, Allen said.

In August 1996 NASA entered into a \$50 million contract with Orbital Sciences Corp. to design, build and test-fly the X-34, a small, reusable technology demonstrator. An additional \$10 million was committed by NASA to be spent in direct support of X-34 by NASA and other government agencies.

Now the contract has been increased by \$7.7 million to purchase long lead-time hardware, including a new wing, fuselage, avionics set, hydraulic pump and actuator system, and more. NASA has committed \$2 million more for the government to provide additional testing and analysis and a second leading-edge thermal protection system.

The X-34 is a single-engine rocket capable of flying eight times the speed of sound and reaching an altitude of 250,000 feet, the X-34 is designed to bridge the gap between the earlier Clipper Graham, or DC-XA, subsonic demonstrator vehicle, and the larger, more advanced X-33.



This artist's concept shows a future X-34 vehicle during a flight test.

Community News

Ready to rodeo?

JSC workers check ropes, cowboy hats for trail ride

By Leslie Eaton

It's time for JSC employees to dust off their 10-gallon hats and put a shine on their space-age spurs when the center's Rodeo Activities Planning Committee will sponsor a variety of activities throughout the rodeo season.

The season kicks-off Friday, Jan. 30, with the first Dress Western Day. Entertainment will begin at 11 a.m. at the Bldg. 3 cafeteria with singing cowgirls and a line-dancing exhibition. Outside the cafeteria will be a demonstration by trick ropers and a paint horse.

The Child Care Center will have rodeo clowns with balloons, a paint horse and a small-animal demonstration to entertain the children.

Events continue Friday, Feb. 6, in the Bldg. 3 cafeteria with a singing cowboy and line-dancing demonstration. Trick ropers also will perform outside the cafeteria from 11 a.m.-1 p.m.

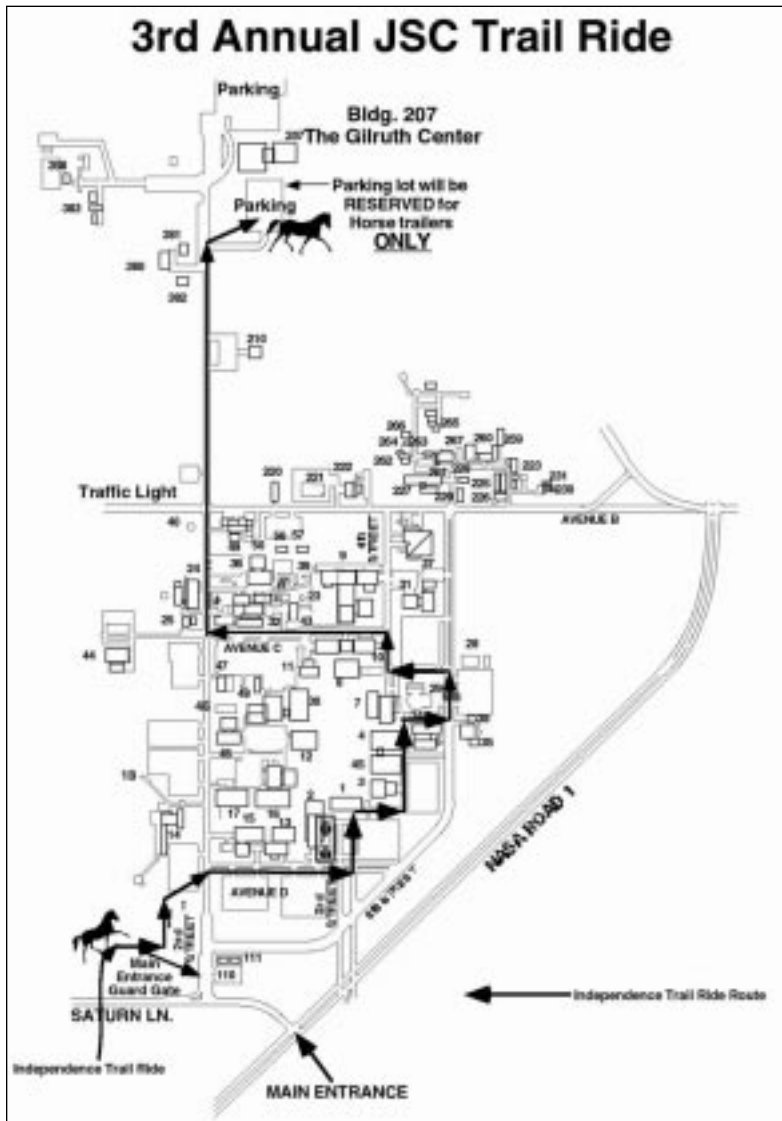
The month-long festivities will culminate with the arrival of the Texas Independence Trail Riders at 3 p.m. Feb. 10.

The trail riders will enter through

the Space Center Houston tram underpass by the Longhorn Project pasture and will be met by the JSC Circle Riders. They will continue the trail ride through the center, stopping at the Gilruth Center. The Texas Independence Trail Riders will set up camp in the wooded area around the pavilion. About 150 horses and riders and 10 to 15 wagons will ride through the center and spend the night at the Gilruth Center before continuing on to the Houston Livestock Show and Rodeo.

The JSC Circle Riders will stop and visit the child care center and allow the children to see the horses. The Child Care Center will welcome the JSC Circle Riders with a chili cook-off after the trail ride.

The NASA/Clear Creek/Friendswood Go Texan committee will host a dinner dance at 7 p.m. Feb. 10. at the Gilruth Center ballroom. Tickets are \$15 for a steak dinner, refreshments and entertainment. About 150 tickets will be available for the dinner-dance. Proceeds will go to the scholarship program of the Houston Livestock Show and Rodeo.



Lockheed's SEAT reaches safety mark

Lockheed Martin's Science, Engineering, Analysis and Test program reached a significant safety milestone in October by passing the 2 million labor hour mark without experiencing a single lost-time work-related injury or illness. This figure equates to 100 employees working 2,000 hours a year for 10 years without an injury.

In an awards ceremony held to honor the achievement, Lockheed Martin Space Mission Systems and Services President Jay Honeycutt commended the 2,200 employees who work on the SEAT program, citing their dedication to the company's high standards of quality and safety. "Your continued pursuit of excellence is evident in countless ways, and this is one of them," Honeycutt said. "This outstanding safety record sets the standard and provides a challenge for the rest of the company to meet."

Under contract to NASA, the SEAT program provides science and engineering services in support of space, earth, and life sciences at JSC. This includes operation of major laboratories to include testing spacecraft structures, payloads, and components in simulated mission environments. Additional services range from science definition to crew member training to ground assistance of astronauts in flight.

Lockheed Martin has modeled its safety program after the OSHA Voluntary Protection Program, which is the standard to which NASA adheres.

"Safety of our employees is our number one priority," Ken Reightler, SEAT vice president and program manager, said at the awards ceremony. He noted that by setting goals above OSHA standards, the SEAT program has implemented a successful multi-level approach to safety that includes "all hands" participation, safety training and awareness programs, hazard abatement and control, and surveillance and inspection.

"Our safety and product assurance department is to be commended for their aggressive approach to safety, and the entire work force is to be commended for their unwavering dedication to this goal," Reightler said.



S-97-014419

Third Annual JSC "Rodeo Liftoff" Events January 30-February 28, 1998

- Friday, Jan. 30** JSC Dress Western Day
Bldg. 3 cafeteria events from 11 a.m.-1 p.m.
Singing cowboys and cowgirls
Line dancing demonstrations
Outside Bldg. 3 cafeteria
Trick ropers
Paint horse
- Friday, Feb. 6** JSC Dress Western Day
Bldg. 3 cafeteria events from 11 a.m.-1 p.m.
Singing cowboys and cowgirls
Line dancing demonstrations
Outside Events (located outside Bldg. 3 cafeteria)
Trick ropers
- Tuesday, Feb. 10** JSC Dress Western Day
Trail Ride Day
2 p.m. Texas Independence Trail Riders
7 p.m. Dinner/Dance at Gilruth Ballroom
Steak dinner by Crazy Cajun Steakhouse
- Friday, Feb. 13** JSC Dress Western Day
- Friday, Feb. 20** JSC Dress Western Day
- Friday, Feb. 27** JSC Dress Western Day

JSC Safety Alert

Protect Yourself During Adverse Weather

What happened

Stormy weather, with heavy rainfall and high winds, creates several conditions in which JSC employees should exercise greater caution. For example, during such storms, broken tree limbs can obstruct walkways; sidewalks and parking lot surfaces become slick; and debris from high winds, such as pea gravel from roads and the tops of some buildings, can cause damage. Close-call reports received by the Occupational Safety Office illustrate that greater caution should be exercised during these conditions.

What being done

The Plant Engineering Division has an ongoing program to trim low-hanging tree limbs and branches and to clear broken limbs along sidewalks following storms. Many sidewalks at JSC are of the pea-gravel type, which become slick during wet conditions. PED repairs these as they are reported to reduce any tripping hazards. PED also corrects low-area sidewalks that collect water during rains. Most painted areas of parking lots, crosswalks, and loading docks use non-skid type paint. Most buildings in the mall area have built-up roofs with gravel as a ballast. The JSC roofs have been inspected by PED and meet national standards. However, gravel may be blown from the tops of buildings during storms when the winds approach 70 miles-per-hour or more. Blowing gravel could be encountered around buildings any time very strong winds are present.

What you can do

Be alert when walking with an open umbrella in the rain (your field of vision is smaller, and in rainy conditions visibility is lower for both pedestrians and drivers. Avoid running on slick surfaces during rainy weather. Always be aware of low branches, especially during windy or stormy conditions. If you're in one of the mall buildings, stay inside or exit only upwind. Avoid being downwind outside of these buildings during high winds. Make sure your insurance will cover property damage, including storm-caused damages, to your vehicle. For more information, contact John Stanford/NA3 at x31347.

Station training facility team earns recognition

A team of employees from USA, GB Tech and Hughes Training Inc., recently received recognition for their efforts in providing support for the timely assembly of the Space Station Training Facility.

The space station training simulator is located in Bldg. 5 South with links to Bldg. 30. It is initially being used to train astronauts for International Space Station assembly flights, the first of which is scheduled for this year.

To successfully complete this project, Hughes Training tapped the expertise in this area that was readily available at USA.

"The space station training support personnel played a major role in the completion of engineering and assembly of the International Space Station simulator," said Bill Wolfe, site manager of Hughes Training.

"Two significant steps were the initial installation of simulator enclosures using structural aluminum panels and the use of a new installation process, the product change order, to manage the work.

"Many problems surfaced during

the construction effort and, to a large extent, were resolved by the determined and persistent efforts of the support personnel. Their diligence helped Hughes Training meet its delivery schedule, while producing a quality product and a cost avoidance of approximately \$100,000."

"I'd like to add my congratulations to the USA team supporting Hughes Training in the space station training facility buildup," said Zack Crow, director, training facilities maintenance and operations for USA.

"I continue to receive positive reports from Cindy Hendershot, operations manager for Hughes, on the innovation and dedication shown by the entire crew.

"There has been a lot of hard work expended getting the facility to where it is today, and a great deal of the credit goes to you and the efforts you have made."

The SSTF has been in the development phase for seven years. It will be incrementally built up to mirror the buildup of the International Space Station on orbit. Training in the new facility began in September.

Action-packed Accomplishment

STS-87 astronauts return home with coffers full of scientific data, scrapbooks full of photographs

STS-87 astronauts returned to welcoming friends, family members and co-workers on Earth in December with a wealth of scientific information and a scrapbook full of photographs.

Columbia and its crew concluded the 16-day science mission on Dec. 5, which included an unplanned but dramatic retrieval of the Spartan satellite.

"It was an action-packed flight," Commander Kevin Kregel said at the Ellington Field homecoming ceremony. "We had a little more action than we anticipated, but with a lot of help from folks here on the ground we managed to take a lemon and make lemonade out of it."

Data was gathered around the clock by a number of investigations in support of STS-87's primary experiment package, the United States Microgravity Payload-4.

"Just about all the customers except one were extremely happy with the science that they got," Kregel said. "We did a great space walk, first to capture a satellite which I think is pretty spectacular. If it had been an unmanned vehicle, any kind of problem, whether technical or procedural, it would have been gone. It would have been junk. We managed to pick up the satellite and bring it back so it will fly another day."

"We did a space walk to look at tools we're going to use to build a space station. We were very fortunate to get two of them because on the first one we found a significant problem on the crane. Instead of having the folks figure out how to make it happen when they're building the space station, Winston (Scott) and Takao (Doi) went out the door again and figured out how we're going to make it happen."

On the second space walk, the pair also tested a JSC designed and built

free-flying video satellite called AER-Cam Sprint, which was maneuvered from the aft flight deck, and provided a God's-eye view of activities in the payload bay.

"That was a homegrown project, done on a fairly tight budget and you really hit it out of the ballpark," Kregel said. "Anybody who reads the paper and looked at the damage that the Mir had, if they had one of those Sprint things, before they sent folks out the door they could have assessed that damage."

Top to bottom, left to right:

1) On *Columbia's* mid-deck, the STS-87 crew poses for the traditional in-flight portrait. In front, from left, are Pilot Steve Lindsey, Mission Specialist Takao Doi of Japan and Winston Scott. In back, from left, are Commander Kevin Kregel, Mission Specialist Kalpana Chawla and Payload Specialist Leonid Kadenyuk of the Ukraine.

2) Scott, left, and Doi (partially obscured by shadows), await the right opportunity to grab onto the Spartan satellite.

3) Backdropped over Africa, Doi tests a 156-pound crane designed to aid space walkers in building the International Space Station.

4) Astronauts Lindsey and Chawla check on an experiment in the mid-deck glove box.

5) Doi waves at fellow crew members during one of the space walks.

6) Scott is backdropped against a blue "blanket" of ocean water.

7) On the starboard side of *Columbia's* flight deck, Lindsey appears fully occupied with laptops to support flight operations.

8) The U.S. Microgravity Payload mission's cargo is picture of *Columbia's* cargo bay.

9) Chawla operates *Columbia's* robot arm from the aft flight deck during operations with Spartan. □



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S-87-307025



S-87-341004



S-87-334023



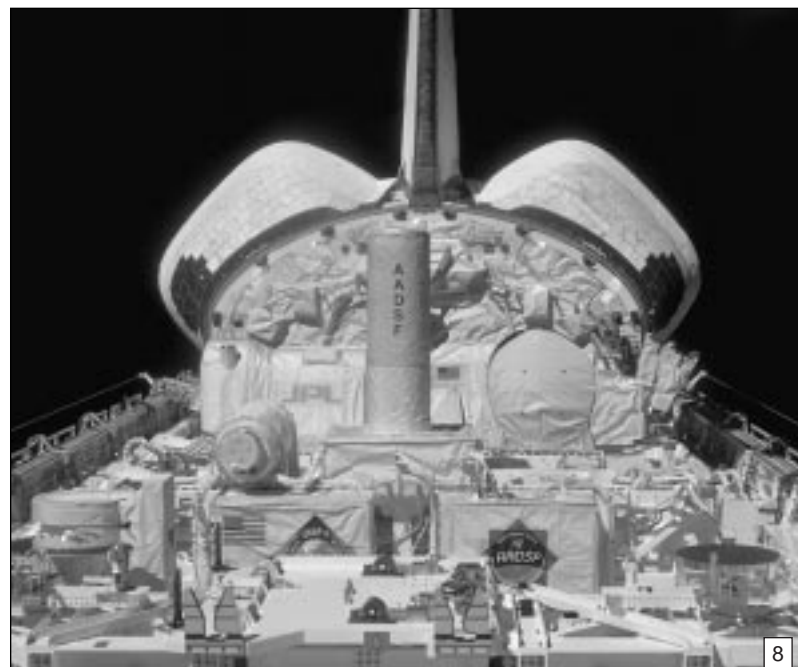
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S-87-375015



S-87-319015



S-87-752023



S-87-357022

Busy As Bees

Ukrainian payload specialist, students in America, Ukraine share growing experience

High school students from the United States and Ukraine took advantage of a rare opportunity to interact with astronauts aboard the Space Shuttle *Columbia* who were conducting plant science experiments during the STS-87 mission.

While the students built simulated flight hardware and studied plant growth, pollination and fertilization of the *brassica rapa* plant in their classrooms, the same plant investigation was taking place in the microgravity environment aboard the shuttle.

The educational activities, a significant component of the Collaborative Ukrainian Experiment payload, were known as Teachers and Students Investigating Plants in Space, or CUE-TSIPS.

"Last weekend, they were all here at the Kennedy Space Center for a wrap-up symposium," said Tom Dreschel, CUE education coordinator for KSC. "The teachers had a lot of good stories about their involvement. All the teachers felt it was a very good program. Every student that they had participating in the project got something valuable from it, learned something from the project."

Until recently, plants grown in space from seeds failed to produce new seeds. Astronaut Michael Foale, aboard the Russian Space Station Mir, used a new technique with a dead bee glued to the end of a toothpick to pollinate plants and successfully produced the first seed-to-seed experiment in microgravity. That same technique was replicated on the shuttle during STS-87 and in schools across the United States and Ukraine.

Dreschel, who worked closely with Principal Investigator Mary Musgrave of Louisiana State University and Paul Williams and Vladimir Nazarenko, the education coordinators for CUE, participated in the teacher workshops that preceded the in-flight activities and coordinated meetings between teachers and scientists. He said about 20 teachers gathered at KSC to share what each school did and early results of the Earth-bound plant growth.

"The combination of do-able classroom activities and the fact that the activities were tied to an experiment in the space shuttle really got the students involved," Dreschel said. "There was a whole range of how well the plants did. Some of the teachers said it was the poorest set of plants they ever grew, and some of them said they did quite well. It was a learning experience. The students were very excited by the fact that they were participating in a NASA experiment."

"We're getting the same feelings from the people in the Ukraine," he added. "We had nine students here from the Ukraine for the launch. They were just in awe of everything they saw there, and got to meet Ukrainian President Leonid Kuchma while they were here."

The CUE mission carried the first cooperative scientific payload between NASA and the National Space Agency of Ukraine. Payload Specialist Leonid Kadenyuk was the primary payload specialist and the first Ukrainian to fly aboard a U.S. shuttle.

On Dec. 1, as part of the STS-87 mission events, Ukrainian students and American students participated in 30-minute downlink session from

the shuttle and studios at JSC, Kennedy Space Center and Kiev, Ukraine, asking questions about similarities and differences in the way the plants grew on orbit and on the ground.

Dreschel said the teachers both in the U.S. and the Ukraine were extremely enthusiastic, and that the downlink events both in America and the Ukraine went well, covering many of the same questions. The Ukrainian downlink was conducted entirely in the students' native language.

Questions ranged from whether the plants and their blossoms remained the same on orbit as on Earth to whether Kadenyuk was having the same trouble keeping his bees used to help pollinate the plants attached to the sticks.

"We are finding a lot of variations in our AstroPlants," asked La Kendra Ross. "Are you finding this to be true with your plants on the shuttle?"

"We select the plants that are sent to the shuttle from a large number of AstroPlants," said Kadenyuk, who got a little help with his English from Commander Kevin Kregel. "We select plants which look the same to load into the PGCs. This step should minimize the variability of the plants in orbit."

Yolanda Benavidez asked whether the flower buds that were developing on the AstroPlant seed population arranged themselves in the "normal" spiral sequence up the stem. The answer: "Yes the flower buds develop the same as on Earth," Kadenyuk said.

"We always have bees that fall off our sticks. Has this problem been considered and how will you deal with it if it should occur?" asked Rebekah Serbin.

Kadenyuk's reply: "The bee sticks we use for flight are made with super glue and we select the best bee sticks for flight."

Yadira Medina wanted to know whether live bees would have trouble pollinating the plants in the space environment?

"Bees have been taken into orbit, but never with flowers, so their behavior in microgravity for pollination has not been studied," Kadenyuk explained. "The bees flown before were in small containers which did not allow detailed observation of their ability to fly in microgravity."

From KSC, Sarah Sherwood asked: "In space, do the roots of the plants grow down and the leaves grow up?"

"The plants grow toward the light and the roots grow away from the light," Kadenyuk said. "Sometimes we see roots start to grow up out of the foam, but they will turn back into the foam to avoid the light and reach the nutrient solution."

Early inspection of the plants grown on orbit show the result of some higher than anticipated temperatures, Dreschel said, but "in the chambers where the temperatures were closer to optimal, it appears the plants were normal."

Musgrave is still in the process of evaluating the data, he said, and comparing the height measurements of Earth-grown plants with those grown on orbit. More data on how the student plants fared is amassing.

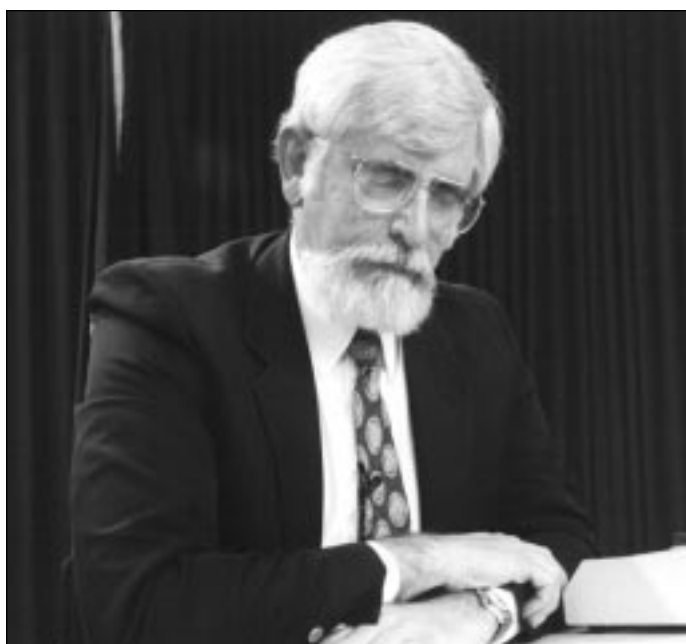
CUE-TSIPS was sponsored by NASA Headquarter's Life Sciences Division and Education Division. □



S-97-17369

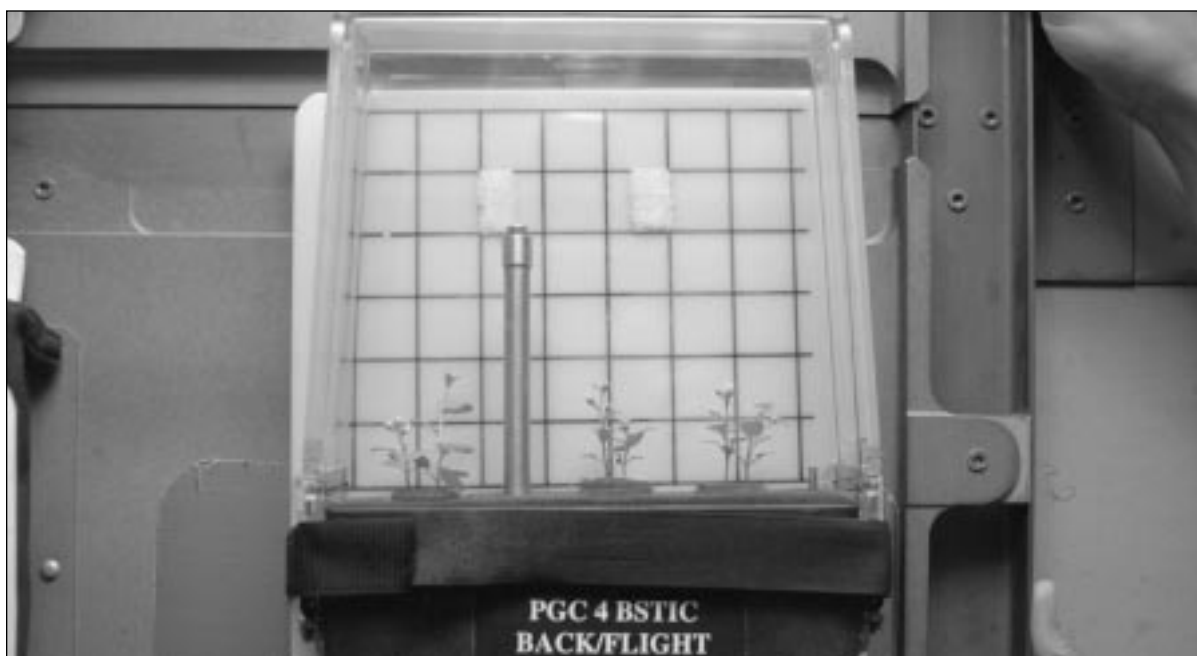


STS-87-332034



S-97-17373

Top: Students gather in Bldg. 2 at JSC to pose their questions to Ukrainian Payload Specialist Leonid Kadenyuk, watching and listening as he and STS-87 Commander Kevin Kregel answered via video downlink. The downlink, which connected students at JSC, Kennedy Space Center and in Kiev, Ukraine, with the astronauts aboard the Space Shuttle *Columbia* on Dec. 1. Above: Kadenyuk works with the *brassica rapa* plants on-orbit using an Optivisor, which provided him a magnified view as he performed the delicate task of pollinating the plants using a bee glued to the end of a toothpick. Left: JSC Astronaut Office Education Working Group's Greg Vogt listens intently to the questions and answers while serving as moderator for the JSC student participation. Below: The plants get a good start on orbit early in the flight.



S87E-5012

25 Years Ago at MSC

Center gears up for lead role in developing space shuttle vehicle

Why does this nation need a space shuttle?

That question was posed last week to Robert F. Thompson, manager of the Space Shuttle Program here, a post he has held since April 1970.

As a sea-faring nation needs ships, so "if you postulate that we should be a space-faring nation, and I believe that we should be, then we must build something with the general capability of the shuttle," Thompson responded.

In the shuttle, he believes, this country is buying a general purpose capability, "a vehicle that, by its reusable nature, will be of relatively low cost in operation."

Thompson sees the shuttle as providing the opportunity and capability of performing many tasks in space, "everything from taking satellites into orbit and planting them, to going back to repair or retrieve those satellites, to conducting medical research programs in space, to conducting engineering experiments, to deploying and supporting space station-type flights, to conducting earth resources, missions for cataloging and understanding what is taking place on the Earth's surface."

MSC has been named the "lead center" in development of this reusable space transportation system called the shuttle.

In a press conference on Jan. 10, Associate Administrator for Manned Space Flight Dale B. Myers said, "The overall management (of the shuttle) on the day-to-day basis will be here at MSC. This would include technical management and responsibility for gathering cost estimates and for managing the cost balance against schedule and technical elements as we move forward in the program."

Of MSC's responsibilities as lead center for shuttle development, Thompson said, "We here will set up and staff to provide an integration or overview function of the program on a day-to-day basis, as well as day-to-day management of the detailed elements of the program assigned here, like development of the orbiter portion of the shuttle."

Current plans call for a small program office staff composed of MSC personnel and key individuals from other NASA centers involved in shuttle work. This group would, in Thompson's words, "be concerned about everything happening across the total program in the way that it should happen and whether the right coordination among the elements of the program—the orbiter, booster engines, launch site activities—is taking place."

A number of center organizations are already working on the shuttle project. During the current study and design phase, the great bulk of the work is being done within the engineering and development directorate, which has a staff co-located in the Shuttle Program Office under Milton A. Silveira.

The administration and program support directorate has provided a program control and contracts supply office, headed by R. Wayne Young, which is located within the structure of the shuttle office.

The technical services division in the center operations directorate is currently building a model of the shuttle cockpit. Divisions of the flight operations directorate are feeding information which will influence the design of the shuttle, such as trajectory problems, timeline analysis, and communication and tracking requirements.

The flight crew operations directorate has submitted data and pos-

sible requirements relative to the crews which will one day pilot the shuttle. The medical research and operations directorate last year completed a study on the influence of G-levels on passengers. There will be other investigations into medical aspects of shuttle flights.

As the shuttle development plan unfolds, more MSC organizations will find themselves involved.

The major milestone for the shuttle program this year will be the letting of a contract to industry for program design-identified in the NASA contracting effort as Phase C of the development program.

Requests for proposals are scheduled to be issued in the early spring, with an awarding of the contract set for early summer.

This reporter asked Shuttle Manager Thompson how he compared the feelings of people today as we move into the shuttle program with those of persons 10 years ago when the nation's goal was to land a man on the moon and return him safely to Earth.

"I think in a much more subtle sense, to people with backgrounds in aviation and airplanes as well as backgrounds in space, the shuttle is an exciting opportunity to combine those two.

"We have never before attempted to build an airplane-like rocket ship or space ship. This gives us a wonderful opportunity to blend our complete background and talent in this area.

"I think that in a much more subtle and professional way, there is an excitement about the shuttle, not as intense and emotional as for Apollo, but excitement nonetheless."

Thompson also believes that "unquestionably, the talent is here at this center which can meet the needs of the shuttle program."



S-71-3878

Above: This version of the space shuttle, one of several under study, shows a delta-wing orbiter riding piggy-back aboard a Ballistic Recoverable Booster. The first stage booster burnout occurs between 172,000 feet and 190,000 feet. The two stages separate, and the orbiter with hydrogen/oxygen tank, attached in tandem fashion continues into space. The booster is parachuted gently into a water landing, recovered, returned to the launch site, refurbished, and used again. The stack could be launched from modified pads at Kennedy Space Center—the same pads used for lunar missions. Below: This artist's conception shows the orbiter portion of the space shuttle as it approaches an airport runway in a conventional landing configuration.



S-71-4084-X

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.

Sign up policy: All classes and athletic activities are on a first come, first served basis. Sign up in person at the Gilruth Center and show a yellow Gilruth or weight room badge. Classes tend to fill up two weeks in advance. Payment must be made in full, in exact change or by check, at the time of registration. No registration will be taken by telephone. For more information, call x30304.

Gilruth badges: Required for use of the Gilruth Center. Employees, spouses, eligible dependents, NASA retirees and spouses may apply for photo identification badges from 7:30 a.m.-9 p.m. Monday-Friday; and 9 a.m.-2 p.m. Saturdays. Cost is \$10. Dependents must be between 16 and 23 years old.

Nutrition intervention program: Would you like to learn more about the role diet and nutrition play in your health? This 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. Feb. 12 and 26 (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.

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 at the Gilruth online at: <http://www4.jsc.nasa.gov/ah/exceaa/Gilruth/Gilruth.htm>

Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Store from 10 a.m.-2 p.m. Monday-Thursday and 9 a.m.-3 p.m. Friday and in the Bldg. 3 Exchange Store from 7 a.m.-4 p.m. Monday - Friday. For more information call x35350 or x30990.

Moody Gardens: Tickets are \$9.75 for two of four events.

Space Center Houston: Adults, \$10.25; children (4-11), \$7. JSC civil service employees free.

Movie discounts: General Cinema, \$5.50; AMC Theater, \$4.50; Sony Loew's Theater, \$5.

Shirts: International Space Station logo pique golf shirts, \$26 and \$28.

Stamps: Book of 20, \$6.40.

1998 Franklin Planners: Replacement refill orders being taken now.

Sweetwater Pecans: Orders are being taken now; cost is \$5.75 per pound.

Metro passes: Tokens and value cards available.

Book available: Suddenly Tomorrow Came: A History of Johnson Space Center.

Balloons: Balloon bouquets for all occasions, prices vary.

Houston Livestock Show & Rodeo: Tickets sales began Jan. 28.

Roundup Deadlines

The Space News Roundup is published every other Friday. Story ideas should be submitted as far in advance as possible, but no later than two weeks prior to the date of publication.

The deadline for Dates & Data calendar items is three weeks prior to the date of publication.

Stories and ideas should be submitted to Kelly Humphries in Bldg. 2, Rm. 180, or via e-mail to kelly.o.humphries1@jsc.nasa.gov

Tailor made for transportation

JSC travel coordinator gets co-workers here to there, back

By Lori Keith

NASA is sending you to Florida for business and you want to take your family for a vacation to Disneyworld. Can you do it? What will you be required to pay? Rose Gardner, a transportation specialist and passport agent, can tell you.

Gardner is the person to see before traveling if there is any type of technical questions about the travel orders, or if any "reg" questions come up. Reg questions are related to any personal deviations for personal preference travel, while traveling for NASA.

If there are any questions when making the reservations, "the agents will do a hard copy and itinerary," Gardner said. "Then it comes to me and I call up to the directorate office to be sure (the traveler) can either do what they want to do, or if they will need to pay for the difference, or if it's actually something that NASA is going to allow."

All scheduling and reservations

related to travel are made through American Express. Domestic travel orders go through Travel Funding, but all overseas travel orders come past Gardner.

The American flagged carrier policy ensures "that government travelers fly American flagged carriers as far in to their destination for temporary duty as we can get them," Gardner said. The main reason is safety—not all airlines have good maintenance practices.

Gardner is the single point of failure passport agent for the entire site. It is her job to make sure travelers have their required visas, if needed.

"Everything down here is a case-by-case brush fire," Gardner said jokingly, "as everyone's needs have to be met." Gardner explains. "Every day is different, but there are a few repetitive duties."

Gardner said she enjoys her job, which involves a lot of personal interaction with others. She said, "(NASA) is always where I wanted to

be. If anything was ever tailor made, somebody measured me and put me in this job."

"Rose is always very helpful and knowledgeable about her job," said Diana Norman, who works in the Space and Life Sciences Directorate Office. "One thing about Rose is that she always greets you with a smile."

A second-generation NASA employee, she has worked here for 10 years, starting as a travel clerk. "The first time I remember coming out here, I was about four years old," she said. "There hasn't been a day in my life I didn't know NASA."

Gardner and her dad, Charles, who worked in what used to be Technical Services Division before he retired, coincidentally have the same starting date anniversary.

Gardner enjoys being in the JSC Circle Trail Riders, and has been the Trail Boss for the past two annual NASA Trail Rides, part of the Houston Livestock Show and Rodeo Kick-Off.



JSC Transportation Specialist Rose Gardner, left, and Flight Crew Operations Directorate Secretary Elaine Kemp go over travel orders in Gardner's Bldg. 1 office.

People on the Move

Human Resources reports the following personnel changes as of Jan. 17, 1998.

Additions to the Workforce

Steve Oswald joins the Astronaut Office in the Flight Crew Operations Directorate as assistant for the Space Shuttle Program.

Patricia Carreon joins the Systems Development and Operations Division in the Mission Operations Directorate as a flight controller.

Diana Hunter joins the Public Affairs Office as a secretary.

Promotions

Sid Schmidt was selected as Resources Management Team lead in the Institutional Business Management Office.

Reassignments Between Directorates

Linda Crockett moves from the Information Systems Directorate to the Center Operations Directorate.

Todd McIntyre moves from the Business Management Directorate to the International Space Station Program Office.

Reassignments to Other Centers

Jerry Adair of the Engineering Directorate moves to Dryden Flight Research Center.

Resignations

Yvonne Ware of the Human Resources Office.

Scott Hendrix of the Business Management Directorate.

Sarah Bethke of the International Space Station Program Office.

Lorraine Otten of the Space and Life Sciences Directorate.

Two NASA-related scholarships now accepting applications

Scholarship applications for both the NASA Exchange-JSC Scholarship Program and the NASA College Scholarship Fund are due by the end of March.

NASA Exchange-JSC Scholarship Program maintains a college scholarship fund to provide financial assistance for dependents of JSC employees to attend college. The Exchange Council expects to award one scholarship to a student on the basis of academic achievement, financial need, and involvement in school or community activities. The scholarship program is open to students currently enrolled and in good academic standing in college, or who will graduate from a public, parochial or private high school this year and who are dependents of eligible JSC employees. An applicant must have a high school grade average of 2.5 on a 4.0 scale, or the equivalent.

Scholarship support of up to \$4,000 will be provided in the amount of \$400 per academic semester, \$250 per academic quarter, and \$200 per summer session, or as the Exchange council determines. In any event, the amount will not exceed \$1,000 in any year.

High school applicants must furnish

a transcript of their high school grades and a record of their scores on either the Scholastic Aptitude Test or the American College Test with their applications or as soon as the results become available. The test results must be furnished prior to March 31.

College students must furnish their most recent transcript of college grades with the application as well as a transcript of high school grades and SAT or ACT scores.

Application forms and the student's scholastic records will be evaluated by the JSC Scholarship Committee. All applicants will be notified by mail of the results by approximately May 15.

Application forms and agreements for the Exchange Council scholarship are available in Bldg. 1 Rm. 457. Please contact Judy Ernult at x31812 for the forms, or Debra Johnson at x34157 for additional information. To be considered for this year's program, completed forms must be returned no later than March 31, in a sealed envelope to: D.L. Johnson, chairman, JSC Scholarship Committee, Mail Code Bl.

Separate applications for the NASA College Scholarship Fund are due by

March 31. The fund was established to provide scholarships agencywide to qualified dependents of NASA and former NASA workers.

The fund was established as a direct result of a substantial unsolicited gift by the late Pulitzer Prize winning author, James A. Michener.

This fund will be awarding five scholarships of \$2,000 each. The scholarship is renewable for six years not to exceed \$8,000. Applicants must be pursuing a course of study that will lead to an undergraduate degree in science or engineering at an accredited college or university in the U.S.

Applicants must be dependents of current or retired NASA employees or dependents of former NASA employees who died while employed by NASA. Applications will be ranked based on a variety of standards.

Applications are available in Bldg. 1, Rm. 840. Completed application forms, transcripts, scores, and materials must be mailed to ARRIVE no later than March 31, at the following address: JSC, the NASA College Scholarship Fund, Inc.; Mail Code AH12/Scholarship Committee; Houston, 77058. For more information, contact Mary O'Connell at x35774.

Devine earns Bocking Secretarial Excellence Award

Judy Devine, division secretary to the chief, Support Operations Division of the Center Operations Directorate, has been awarded the Marilyn J. Bocking Secretarial

Excellence Award.

Devine was recognized for coordinating the move of the Security Branch from Bldg. 45 to Bldg. 419. She also was cited for volunteering

to assist a Center Operations Accident Review Board by providing more than 200 pages of typed witness testimony while still keeping up with her daily office routine.

Dates & Data

Feb. 4

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Feb. 4 in Bldg. 31, Rm. 129. An open discussion meeting is planned. For more information, call Al Jackson at x35037.

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Feb. 4 at the House of Prayer Lutheran Church. For more information, call Jeannette Darcy at x45752.

Communicators meet: The Clear Lake Communicators will meet at 11:30 a.m. Feb. 4 at Lockheed Martin, 555 Forge River Road. For more information, contact Henry Duke at 281-280-4403 or Melissa Sommers at 281-332-0698.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. Feb. 4 at USA, 600 Gemini. For details, call Patricia Blackwell at 281-282-4302 or Brian Collins at x35190.

Feb. 10

Aero Club Meets: The Bay Area Aero Club will meet at 7 p.m. Feb. 10 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. Feb. 10 at Robinette and Doyle Caterers, 216 Kirby in Seabrook. Dinner costs \$14. For more information call Sina Hawsey at x36582.

Feb. 11

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Feb. 11 at the House of Prayer Lutheran Church. For more information, call Jeannette Darcy at x45752.

Communicators meet: The Clear Lake Communicators will meet at 11:30 a.m. Feb. 11 at Lockheed Martin, 555 Forge River Road. For

more information, contact Henry Duke at 281-280-4403 or Melissa Sommers at 281-332-0698.

Spaceteam Toastmasters meet: The Spaceteam Toastmasters will meet at 11:30 a.m. Feb. 11 at United Space Alliance, 600 Gemini. For details, call Patricia Blackwell at 281-282-4302 or Brian Collins at x35190.

Astronomy seminar: The JSC Astronomy Seminar will meet at noon Feb. 11 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. Feb. 11. For more information, call Elaine Kemp at x30556.

Feb. 12

MAES meets: The Society of Mexican American Engineers and Scientists will meet at 5 p.m. Feb. 12 at Mario's Pizza in Webster. For

more information, call Gerard Valle at x38835

Feb. 13

Astronomers meet: The JSC Astronomical Society will meet at 7:30 p.m. Feb. 13 at the Center for Advanced Space Studies, 3600 Bay Area Blvd. For more information, call Chuck Shaw at x35416.

Feb. 18

Scuba club meets: The Lunarfans will meet at 7:30 p.m. Feb. 18 at the Redfish Restaurant under the Kemah/Seabrook bridge, Seabrook side. For more information, call Mike Manering at x32618.

Feb. 19

Directors meet: The Space Family Education board of directors will meet at 11:30 a.m. Feb. 19 in Bldg. 45, Rm. 712D. For more information on this open meeting, call Gretchen Thomas at x37664.

AIAA seminar: The American

Institute of Aeronautics and Astronautics will host a technology transfer seminar at 6:45 p.m. Feb. 19 at 2450 NASA Road.1 Rm. 32C. Jim Cameron, senior consultant for marketing for NASA-Mid Continent Technology Transfer Center, will speak about technology commercialization opportunities for today's companies. Reservations are due by noon Feb. 18 to Charles Halliman at (713)991-1654.

Feb. 25

Spaceland Toastmasters meet: The Spaceland Toastmasters will meet at 7 a.m. Feb. 25 at the House of Prayer Lutheran Church. For more information, call Jeannette Darcy at x45752.

Communicators meet: The Clear Lake Communicators will meet at 11:30 a.m. Feb. 25 at Lockheed Martin, 555 Forge River Road. For more information, contact Henry Duke at 281-280-4403 or Melissa Sommers at 281-332-0698.

NASA Briefs

JSC scientist's experiment to fly on Mars Surveyor 2001

NASA has selected additional instruments for the Mars Surveyor 2001 missions, which will study Mars' environment. The Mars Surveyor 2001 missions will follow two other robotic Mars missions to be launched in late 1998 and early 1999. All are part of NASA's long-term, systematic exploration of Mars in which two missions are launched to the planet approximately every 26 months. The Martian Radiation Environment Experiment will characterize the radiation environment in orbit and on the surface of Mars simultaneously. This experiment will consist of radiation spectrometers on both the Mars 2001 Orbiter and on the Mars 2001 Lander. JSC's Dr. Guatam Badhwar is the principal investigator. The Mars Environmental Compatibility Assessment will characterize Martian dust and soil to identify potential undesirable and harmful interactions with human explorers and associated hardware, and to evaluate properties of the soil related to its use as a construction material. The 2001 missions represent the first step in a NASA initiative to integrate the requirements for Space Science and the Human Exploration and Development of Space program into a single robotic exploration program for the next millennium.

Lunar Prospector in final mapping orbit around Moon

The Lunar Prospector spacecraft has been placed successfully into what might be termed its "final mapping orbit," according to the Mission Control Center at Ames Research Center. Trim maneuvers placed the spacecraft into a 99 by 100 kilometer orbit, with a polar inclination of 90 degrees and a period of 118 minutes. Mission operations personnel will fire the spacecraft thrusters at periodic intervals to reboost the vehicle to its desired, circular mapping orbit. Engineers believe Lunar Prospector will remain within the mapping orbit limits for about two weeks before any adjustment burns are necessary. Since one of the mission experiments is designed to provide more information about the gravity model of the Moon, the time required between burn maneuvers was uncertain. MCC personnel will be gaining knowledge on this aspect of the operation as the Lunar Prospector mission progresses.

Glenn to perform aging research in space

(Continued from Page 1)

leged," Glenn said at the NASA Headquarters news conference in which the announcement was made. "The important thing is the opportunity that this gives to take us in some new directions in research."

Since aging and space flight share a number of similar physiological responses, the study of space flight may provide a model system to help scientists interested in understanding aging. Some of these similarities include bone and muscle loss, balance disorders, and sleep disturbances. Space biomedical researchers and gerontologists

believe more research in these areas could help older people live more productive lives, and could reduce the number of individuals requiring long-term medical care in their later years.

Glenn has been a catalyst in promoting the use of space flight for the benefit of healthy and productive aging.

The human research on this mission will be conducted by NASA and the national Institute on Aging, part of the National Institutes of Health. The research was peer reviewed by independent scientists, and includes studies on sleep disorders, muscle atrophy, balance, and clinical evaluations

of blood and heart function.

"The research on this mission will contribute to building our knowledge and understanding of the aging process," said Dr. Richard Hodes, director of the National Institute on Aging. "The data collected will be used to conduct continued research on how aging affects sleep cycles, muscle deterioration, and balance."

Dr. Michael DeBaakey, Chancellor Emeritus of Baylor College of Medicine, who reviewed the medical data on Glenn, said he sees "no evidence to prevent him from going into space. Flying Senator Glenn offers important opportunities to study the

effects of the space environment on aging systems as has never been done in the past."

Before NASA made the decision to fly Glenn, the senator underwent a battery of medical tests conducted by NASA physicians and by independent consultants. They all found him medically qualified for space flight. According to NASA flight surgeons, Glenn's fitness level is excellent.

"We have 42 years of medical history on Senator Glenn and we were able to perform an exhaustive medical evaluation," said Dr. Denise Baisden, a NASA flight surgeon. "He is medically qualified to fly."



98-00606

BLOOD DRIVE- Nestor Gonzalez of St. Luke's Episcopal Hospital Blood Donor Center prepares to tap into JSC employee Ragan Edmiston for a donation of platelets during the first JSC On-Site Blood Drive of the year. JSC employees continued to share their generosity by increasing the community's blood supply with 379 total blood donations, a 17 percent increase over last year's first drive. Dan Mangieri, co-chairman of the Blood Drive Committee, said the next on-site drive is March 31 and April 1.

New lightweight external tank to launch station era

A significant achievement toward the first launch of the International Space Station was unveiled this month. The space shuttle's first new, super lightweight external fuel tank rolled out Jan. 16, during ceremonies at Michoud Assembly Facility in New Orleans, La.

In order to launch the space station to its on-orbit location, "the space shuttle system needed additional performance - either through more power or less weight," said Parker Counts, manager of the external tank project at Marshall Space Flight Center.

"Since each pound removed from the external tank equals a pound of payload that can be carried into space, NASA developed the super lightweight tank," Counts said.

The new external tank is the same size as the one currently used on the space shuttle-but about 7,500 pounds lighter.

The largest single component of the space shuttle, the 154-foot-long external tank stands taller than a 15-story building and is as wide as a silo with a diameter of about 27 feet. The external tank holds the liquid hydrogen and liquid oxygen propellants in two separate tanks for the shuttle's three main engines.

The two major changes to the external tank involved materials and design. Both the liquid hydrogen tank and liquid oxygen tank are constructed of aluminum lithium - a lighter, stronger material than the metal alloy used for the shuttle's current external tank. The tank's structural design also has been improved providing more strength and stability than the previous design.

Following the rollout, the tank was shipped by barge from Louisiana to Kennedy Space Center for its first launch, which is scheduled in May on the STS-91 mission.

Spring softball registration begins this month

Registration for the Gilruth Recreation Center Spring Softball Leagues will begin Monday and end Feb. 20.

Games will begin the week of March 2. Gilruth Center policy requires every player to have a pictured Gilruth Center Badge or a Blue Outside Player Badge in their posses-

sion at all times.

Only official and completed rosters will be accepted during sign-ups. Full payment of fees are due at the time of sign-ups. Cost is \$275 per team for competitive leagues, or \$200 per team for recreational leagues. For more information, call x33345.

Thomas to close out Phase 1 presence on Mir

(Continued from Page 1)

gifts and formal welcoming remarks. Thomas will be the final American to live and work aboard Mir as part of the Phase 1 Program of shuttle-Mir dockings and crew exchanges designed to promote engineering, operations and cultural exchanges between the U.S. and Russia prior to construction of the International Space Station.

A fit and leak check of the pressure suit, known as a Sokol suit, had to be accomplished prior to the official transfer of Thomas to Mir, but Thomas encountered difficulty in getting his suit to fit properly and reported it would not fit over his head. Later, he completed a leak and pressure check wearing Wolf's suit, and after lengthy

discussions between U.S. and Russian flight controllers, a joint decision was made to allow Thomas to move over to the Mir. Although Wolf's suit is a little large for Thomas, especially in the arms, it is considered safe to use in the event the Soyuz capsule must depart the Mir because of an emergency. The crew transfer took place at about 5:35 p.m. CST Sunday.

Transfer of hardware and supplies to and from the Mir space station began the prime order of business after the crew exchange. *Endeavour* ferried more than 7,000 pounds of equipment and supplies to Mir, including a new air conditioner.

Flight controllers struggled briefly and the crew lost some sleep late

Sunday, when an erroneous sensor reading showed a leak on one of *Endeavour's* reaction control system jets. It was shortly determined that the sensor showing the leak was faulty and onboard monitoring of the affected jet could be managed with a software change, which required full testing in JSC's Shuttle Avionics Integration Laboratory. Following the sensor failure, Mission Control asked Russian controllers to let Mir maintain attitude control for the joined spacecraft.

Not long after the handover of control, however, Russian engineers monitoring Mir determined that the space station was low on thruster fuel in its outboard "boom" thrusters. Flight

controllers in the U.S. and Russia worked together and decided that, with good communications contact, Mission Control could watch *Endeavour's* thruster and the shuttle could resume control. The ground had to awaken Wilcutt, Edwards, Solovyev and Vinogradov to make the switch back, which took only a few minutes.

Endeavour and its seven astronauts streaked into orbit on time at 8:48 a.m. CST Jan. 22 from Kennedy Space Center's Launch Pad 39A.

Landing was set for 4:36 p.m. CST Jan. 31. If the mission concludes on time, the crew is expected to return to Houston and a welcome home ceremony outside Hangar 990 at Ellington Field about 4 p.m. CST Sunday.

Station's first element heading for launch site

(Continued from Page 1)

Station is 1998. This is something that all of us have looked forward to for a very long time. We have a lot of exciting and challenging activities ahead as we begin our assembly in orbit. The incredible efforts of a worldwide engineering and development team will be coming to fruition, and a new, unprecedented phase of space construction will begin."

The FGB was built by Khronichev under contract to Boeing, NASA's prime contractor for the station. Manufacturing began in 1994 and was essentially completed in November 1997. However a slip in the shuttle launch schedule delayed the date by seven months, during which time Khronichev added enhancements to the FGB making it

a more robust module and providing additional backup capabilities for the early International Space Station.

"We are moving from vision and imagination to one of tangible hardware on orbit," said Royce Mitchell, Boeing ISS vice president and deputy program manager. "The FGB team - NASA, RSA (Russian Space Agency), Boeing and Khronichev - is a symbol of international success. They have overcome distance, language and cultural barriers to design, develop and deliver space flight hardware."

The late June launch of the control module will provide the initial propulsion and power for the International Space Station and begin the five-year, 45-flight orbital assembly of the station. As assem-

bly continues, the control module will provide orbital control, communications and power for the second piece of the station, a connecting module, Node 1, that will be launched in July. The control module will control the motion and maintain the altitude of the station's orbit. During the initial construction phase, the control module will generate and distribute electrical power and provide ground communications. In the later phases of ISS assembly, the control module will primarily provide storage capacity. In addition, its external fuel tanks will be used throughout the lifetime of the station.

Shortly after the control module is launched from Russia, *Endeavour* will launch on STS-88 from Kennedy Space Center, with Node-1(built by

Boeing at NASA's Marshall Space Flight Center). The node was shipped to Kennedy to begin a year of launch preparations and final testing in June 1997. Two mating adapters, also built by Boeing, have since been shipped to Kennedy from California and are being attached to the node prior to its launch.

Endeavour's crew will dock the control module to the node and perform three spacewalks to make the final connections between the two components during the 11-day flight.

The station then will await the launch of the Russian-built Service Module, a component that will become the early living quarters, targeted for December. The first crew of the station is planned for launch on a mission in early 1999.



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