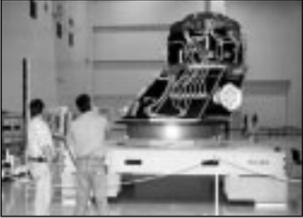


# Space News ROUNDUP!

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International Space Station components being readied for shuttle launches.

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Find out the latest on Lunar Prospector and Mars Pathfinder next week.

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Then, it was a small, single-purpose capsule. Now, it's a large, multipurpose orbiter.

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Twenty years ago, the Space Shuttle Enterprise made its first visit to JSC.

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JSC employees scope out the partial solar eclipse, and receive Stellar Awards.

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Local school district breaks ground for intermediate school on JSC grounds.

Page 8

## Collins first female shuttle commander

Two flights as pilot prepare her for STS-93 assignment

Astronaut Eileen Collins will become the first woman to command a space shuttle when *Columbia* launches on the STS-93 mission in December 1998.

First Lady Hillary Rodham Clinton made the announcement March 5 from the Roosevelt Room at the White House.

The Air Force lieutenant colonel will be joined on the flight deck by

Pilot Jeffrey Ashby, a Navy commander. Mission Specialists Steven Hawley and Catherine "Cady" Coleman, an Air Force major, and Michel Tognini, a CNES astronaut and French Air Force colonel, round out the crew.

Selected as an astronaut in 1990, Collins has served as a pilot on her two previous space flights. Her first space flight was STS-63 in February

1995 as *Discovery* approached to within 30 feet of Mir, in a dress rehearsal for the first shuttle-Mir docking. In May 1997, she visited the Mir space station as pilot on board *Atlantis* for the sixth shuttle-Mir docking mission, delivering Astronaut Mike Foale and returning Jerry Linenger to Earth.

STS-93 will be the first flight for Please see **COLLINS**, Page 8



Eileen Collins

## JSC passes final ISO 9001 quality audit

JSC successfully passed its final ISO 9001 Quality Management System audit at the end of February, and has been recommended for registration—the first NASA center to achieve the distinction.

JSC's formal ISO 9001 registration, which builds upon the previous success of its White Sands Test Facility, is expected in about eight weeks after certifying bodies in the United States and Europe have validated the results of the audit performed by National Quality Assurance, USA.

According to JSC Director George Abbey, this is a significant testimonial to the excellence of our quality system at JSC, but also a starting point for continuing improvement of our overall technical and management processes.

ISO 9000 Office Director Lee Norbraten said JSC always has been at the forefront in scientific and engineering achievement, and that ISO 9001 registration proves the center is at the forefront in the overall excellence of its technical and management processes.

"ISO 9001 registration is significant not just in what it stands for, but in that it required the active participation of a huge number of people from every corner of the center, and every level of the organizational structure," Norbraten said. "We have proved that our quality management structure complies with the highest known standard for quality; the challenge now is to use that framework to improve the effectiveness of how we operate."

Norbraten said a presentation ceremony will be scheduled sometime in April, and that the auditor will return May 11-13 to follow up on the results of the February audit. At that time, JSC must be able to prove that its corrective action systems are in full and effective operation.

Thousands of hours of work were required to make this a reality, he added. In some cases, this meant for

Please see **ISO**, Page 8

National Aeronautics and Space Administration  
**Lyndon B. Johnson Space Center**  
 2101 NASA Road 1  
 Houston, Texas 77058-3696



Reply to Attn of: AA

### CONGRATULATIONS ON SUCCESSFUL AUDIT

Dear Fellow Employees:

I would like to congratulate the JSC team for successfully completing the registration of the center's quality system to the ISO 9001 standard. Through your efforts, JSC is now the first NASA center and the largest Federal organization ever registered. Our effort required much hard work and dedication on the part of the entire team, and represents an important milestone for the center.

The agency set a goal for all centers to achieve registration, and JSC has done that. However, it is important to keep in mind that registration, though an important achievement, is not where we gain the most value from our efforts. The real benefit comes from increasing discipline in our processes and using our system to improve the work we do every day. That is our challenge as we go forward. With your help, I'm confident that we'll further strengthen JSC's Quality System and realize even greater benefits for the center and our customers.

We can be proud of our achievements, while recognizing that we still have much to do. JSC is a complex organization with many dynamic and diverse activities—characteristics that made implementation a challenging task. The coming year will continue to present opportunities for improvement, and I know we are up to meeting the challenge. Again, I extend my congratulations and appreciation for a job well done.

*George W. S. Abbey*  
 George W. S. Abbey  
 Director

## Bush accepts Rotary's National Space Trophy

Former President George Bush, who was instrumental in launching a new era in human and robotic space exploration during his administration, received the National Space Trophy at a March 6 black-tie celebration at Space Center Houston.

Several JSC employees were among 16 recipients of Stellar Awards from the non-profit Rotary National Award for Space Achievement Foundation, established in 1985 by the Space Center Rotary Club to recognize individuals who have made outstanding achievements in space, creating a greater public awareness of the benefits of space exploration.

The theme for the annual space industry awards banquet was "Dreams to Destiny," celebrating the accomplishments and contributions of individuals in making the dream of space exploration a practical reality.

Bush was cited for his "excep-

tional leadership in providing the nation with the vision and means to accomplish its goals in space for the 21st Century."

In 1989, under the Bush administration, the world entered into a new era of space science as NASA dispatched the Magellan spacecraft to map Venus, Galileo to Jupiter, and the Cosmic Background Explorer to study the origins of the universe. In addition, Bush committed this country to further pursue the human exploration of space when on July 20, 1989, the 20th anniversary of the Apollo 11 moon landing, he announced the goal to establish a permanent human presence on the Moon and to use that experience to begin human space exploration of Mars. Two years later, in 1991, the U.S. and the Soviet Union agreed to exchange astronauts and cosmonauts on the Mir and the space

Please see **ROTARY**, Page 7



Former President George Bush of Houston enjoys the limelight at the gala dinner in which he received Rotary International's National Space Trophy at Space Center Houston. Joining Bush are Rep. Nick Lampson, D-Texas, NASA Administrator Daniel S. Goldin and JSC Director George Abbey. Several JSC workers received Stellar Awards for their accomplishments at the banquet.

Photo courtesy Rotary International



# Community News

## JASON Project Live Broadcasts Open to JSC Government, Contractor Employees

By Mae Mangieri and Lori Wheaton

JSC civil service and contractor employees are invited to attend live one-hour broadcasts for the JASON IX Project that will be held at 9 a.m., 10:30 a.m. and 1:30 p.m. each week day March 16-27 in the Teague Auditorium. Thousands of area students and teachers will participate in the live telepresence broadcasts titled "Oceans of Earth and Beyond." JSC serves as a primary interactive network site for the telecasts which originate from research sites in Monterey Bay and Bermuda.

The JASON Project is a year-round scientific expedition designed to excite and engage students in science and technology. It was founded in 1989 by Dr. Robert Ballard, after his discovery of the R.M.S. Titanic. This year's JASON IX Project titled "Oceans of Earth and Beyond" is designed to study the structure of shallow, mid-water and deep ocean environments and the life they support.

Students will explore a variety of marine communities and related phenomena such as coral reefs, kelp forests, hydrothermal vents, cold seeps, marine snow and exotic deep sea creatures. Students also will find out how recent discoveries in space are providing new clues to the origin of the earth's oceans and will explore the latest evidence of oceans beyond Earth, on Jupiter's moon, Europa.

During the two week program, over 2000 teachers and students will take field trips to JSC for the JASON IX broadcasts. Students and teachers spend countless hours both in and out of the classroom preparing for the telepresence experience.

JSC's Education and Information Services Branch provided comprehensive professional development workshops for 130 teachers in

December 1997, where they received free JASON IX curriculum to ensure that their students understand the scientific principles they'll encounter during the live program. The teachers participated in hands-on classroom activities from the curriculum led by Gordon Eskridge, an aerospace education specialist from Oklahoma State University.

As an additional professional development opportunity, JSC invited experts from Armand Bayou Nature Center, Texas Parks and Wildlife Department, Texas State Aquarium, Sea Center Texas and Sea Camp at Texas A&M University

at Galveston to give presentations to help teachers implement the many JASON IX curriculum investigations.

Each year, a number of students and teachers is selected to accompany Dr. Ballard on the JASON Project expedition as argonauts. These special ambassadors help the scientist on site with their research and explain the activities to the telepresence audience.

This is the first time JSC has a student argonaut since the outreach program began participating as a PIN site in 1993. Nicholas Cenegy, an eighth grader at McCullough Junior High School in the Conroe Independent School District, was selected based on his interest and ability in science and technology and good leadership skills. "Science is my absolute favorite subject in school," wrote Nicholas in his argonaut application. "It's so stimulating and fascinating, and it is involved in our everyday life."

For more information, please call Lori Wheaton at 483-8619 or Mae Mangieri at 483-2929. Information also is available on the JASON Project website on the Internet at "www.jasonproject.org"



**JASON PROJECT™**

## Moon and Mars briefing set

JSC will host a panel briefing on the Lunar Prospector and the Mars Pathfinder at 10 a.m. March 18 in the Teague Auditorium. The panel speakers are Lunar Prospector Principal Investigator Alan Binder from Ames Research Center and Mars Pathfinder Project Scientist Matthew Golombek from the Jet Propulsion Laboratory. Binder and Golombek will provide updates on

findings and results from their projects. Doug Cooke, manager of the Exploration Office, will act as the panel moderator.

Civil service and contractor employees are welcome to attend and participate in a question and answer session following the presentations.

For more information, contact Jovan-Justine Love at x39319.

## Zavala earns top secretary honors

Angie Zavala, division secretary to the chief, Support Operations Division of the Center Operations Directorate, has been awarded the Marilyn J. Bocking Secretarial Excellence Award.

Zavala was recognized for planning and organizing the secretarial

activities of the Structures and Mechanics Division office to assure meeting specific deadlines and goals. She also was cited for her dedication to detail and for compiling inputs from all the branches within SMD into an organized and concisely formatted report.

## British students to observe engineers, scientists at JSC

Two 16 year old students, Libby Jackson and Sally Davis traveled across the Atlantic Ocean from England to visit JSC from March 2 through March 13 to observe JSC engineers and scientists. This will fulfill a requirement of one of their school's programs to follow members of professions that they are considering as a career option in order to find out what is involved in the job.

Jackson and Davis attend Newstead Wood School and are both interested in careers in space sciences and engineering. They felt that a work shadowing placement within NASA would be of benefit to them. Jackson is considering a college major in aeronautical engineering and Davis is considering a major in astrophysics and is applying to Oxford University.

The Outreach Program within the Space and Life Sciences Program Integration Office is hosting the two British students and has set up opportunities for them to meet with co-ops as well as seasoned professionals from the Engineering Directorate, Mission Operations Directorate, the Space and Life Sciences Directorate and the Flight Crew Operations Directorate.

## Relay run to benefit Habitat for Humanity

Employees of Northrop Grumman Corp. have thrown down the gauntlet and are challenging other Clear Lake area contractors to put their money "where their feet are"

Under the banner, "We Keep JSC Running", the 370 employees working on the ISC contract, which includes Boeing Corp., and several other subcontractors, will be running a non-stop relay from 6 p.m. March 20 until 6 a.m. the following Monday at the Clear Creek High School track. Habitat for Humanity, a non-profit organization that builds homes for disadvantaged families, will be the sole beneficiary of the event.

"If it was easy, it would have already been done by another organization," said Tom Arnsmeier, ISC program manager.

Total mileage will be tallied as a means of soliciting contributions.

Northrop Grumman welcomes other contractor organizations to participate, sponsor or contribute to the effort. For more information, contact Jeanie Wright at 280-3882.

## JSC Safety Alert

### Removing Safety Caps From Gas Cylinders

#### What Happened

In the process of removing the safety cap from a breathing air gas cylinder, the cylinder's valve was accidentally opened. This inadvertent opening of the valve could result in a particle being propelled by the gas flow that could result in an injury; noise that could cause ear damage; or a toxic release if the cylinder contained a hazardous gas.

#### Outcome Of The Investigation

It was reported that a vendor tag and the gas analysis was jammed between the safety cap and the valve handle. When the cap was unscrewed, the valve was opened. Using the improper tool to remove a stuck, rusted, or difficult to remove safety cap could also cause the cylinder's valve to open. A screwdriver or wrench stuck in the safety cap's ventilation hole (or slot) to assist in removing the cap can also cause the gas valve to be inadvertently opened.

#### What You Can Do

Always use the proper tool (a strap wrench or a spanner wrench) to remove the safety cap of a gas cylinder to avoid inadvertently opening the cylinder's valve. These tools do not protrude into the safety cap area when used. A screw driver, open end wrench, adjustable wrench are unacceptable, as they may come into contact with the gas valve handle inside the cap causing it to open unintentionally. Improvising with improper tools may cause a hazardous condition.

Additional care is being taken to attach paper work to a gas cylinder in a manner that will not cause jamming of the gas valve inside the safety cap.

For more information on tools, call the Occupational Safety Office at extension 36345

## 'Give the Gift of Life'

# JSC sets date for next blood drive

JSC's next blood drive is scheduled for 7:30 a.m. to 4:00 p.m. March 31st and April 1st in the Teague lobby, building 2. It's a great way to participate in an important community activity and a special invitation is being made to those who may want to try donating blood for the first time. No appointment is needed to donate whole blood, however appointments are encouraged for those wishing to donate plasma or platelets.

For those who have never donated blood, the process is pretty simple. It starts with a blood sample. Afterwards, one pint of blood is drawn. Drawing whole blood takes seven to ten minutes, with the overall process usually taking around 45 minutes including screening. The donated blood undergoes several tests, including the tests for hepatitis and HIV. If there are reactive test results donors are notified by mail.

All results are kept confidential. Usually there are no negative reactions to giving blood, but trained personnel are always available in case a donor becomes light-headed.

Employees can now access JSC's On-site Blood Drive schedule on the web. It is located on the Human Resources Office homepage in the Employee Activities section.

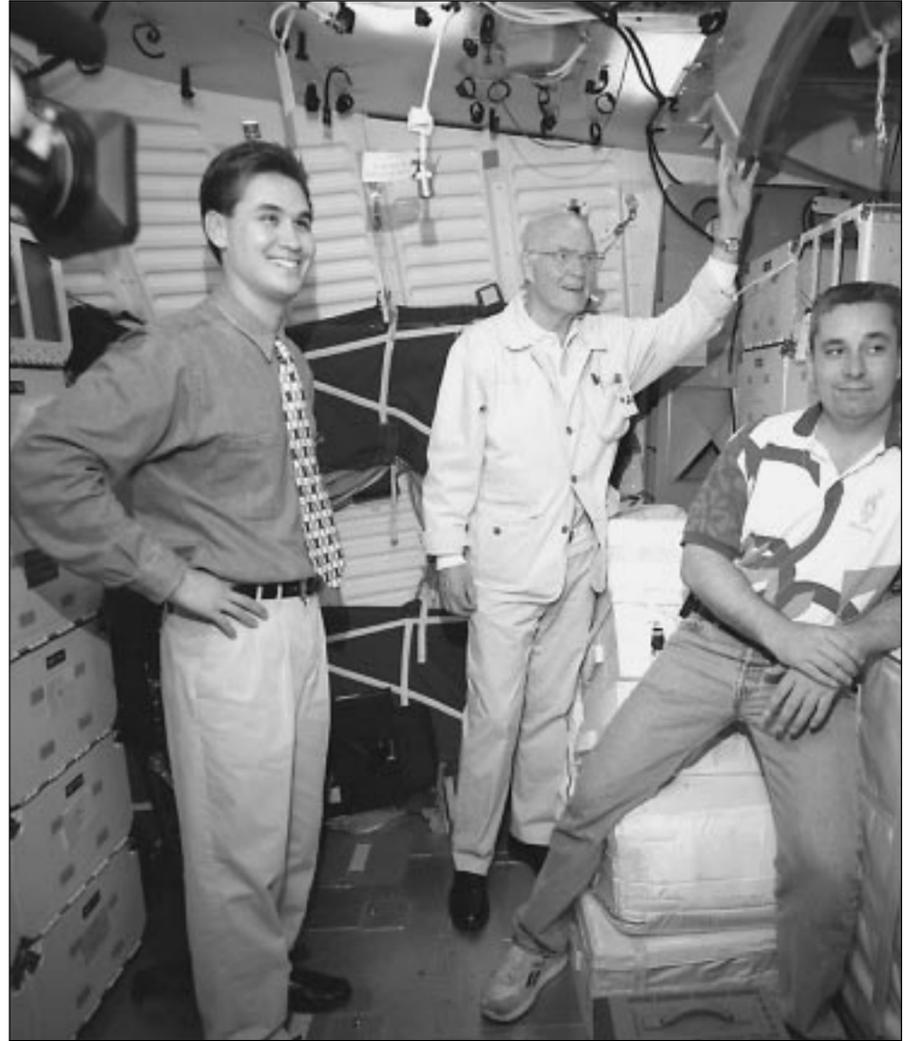
For more information about the JSC on-site blood drive call Dan Mangieri at x33003. To schedule an appointment call Donna Stuart at x33032.

Generally, donors can give blood every eight weeks. In some cases a donor may be deferred if, for example, their blood is low in iron or they've been on certain medications. If prospective donors have questions about how a medical condition may affect their ability to give blood they can call St. Luke's Blood Donor Center at (713) 791-4483.



S98-02327

Suit Technicians Mike Birkenseher and Jean Alexander suit up Sen. John Glenn prior to entry into the crew compartment trainer for egress training.



S98-02331

Adam Flagan, crew trainer, Sen. John Glenn and Jason Fennelly, photographer, enjoy a relaxing moment during a break in training in the crew compartment trainer.



S98-02328

Suit Technician Jean Alexander checks Sen. John Glenn's suit after egress from the crew compartment trainer as Carlous Gillis looks on.



S98-02328

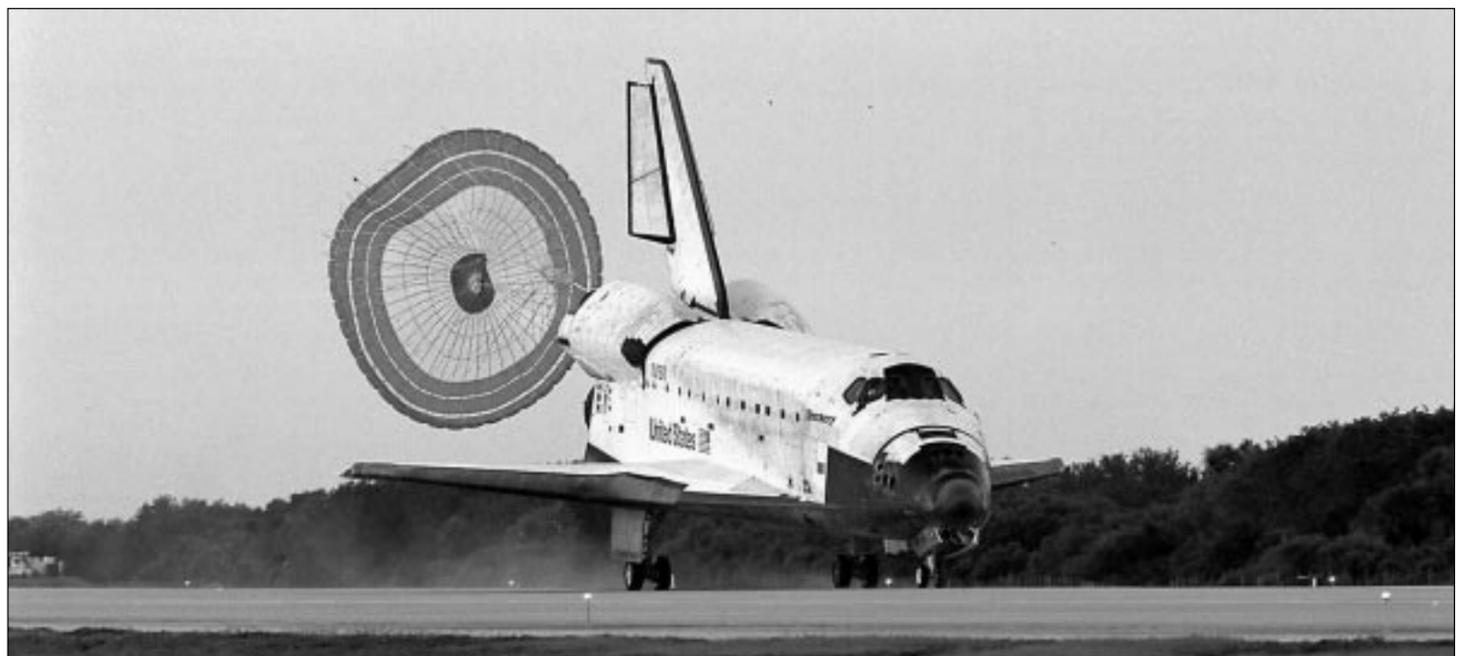
Sen. John Glenn studies the crew escape slide in the crew compartment trainer during emergency egress training.



S98-02330

Sen. John Glenn receives crew escape pole training from Sharon Jones using the functional pole trainer.

Drag chute release on *Discovery* at Kennedy Space Center's Shuttle Landing Facility.



KSC-97PC-1250

# Then and Now

## A Mercury-Space Shuttle Comparison

By Kelly Humphries  
with data generated by Joe Loftus

Capsules have become winged spacecraft, astronauts have become both pilots and scientific specialists, and the world has gone from Cold War to cooperation in the years following John Glenn's historic orbital flight.

The Mercury spacecraft, at the pinnacle of human technical achievement in 1962, pales in comparison to today's spacecraft that are capable of carrying up to seven humans and millions of dollars worth of sophisticated research instruments into orbit and returning them to Earth with a soft runway landing. And the engineering expertise that built that small vehicle has matured to the point that is ready to undertake the next greatest human engineering achievement, the construction of an orbiting International Space Station.

John Glenn's mission initially was set to launch on Dec. 20, 1961, then Jan. 16, 1962, then Jan. 23, 1962, then Jan. 27, 1962 when the Mercury-Atlas rocket was finally fueled, but the countdown was scrubbed at T-13 minutes by adverse weather. Subsequent launch attempts on Feb. 13, 14, 15, and 16 also were scrubbed by adverse weather or technical problems and the launch was reset for Feb. 20. By comparison, NASA in 1997 launched eight shuttle missions, all of them on schedule or within 30 minutes of the planned launch time.

Friendship 7 was launched from Cape Canaveral, Fla., Launch Complex 14 into a 162.2 by 100 statute mile orbit, inclined 32.54 degrees to the equator. By comparison, the STS-95 mission will launch from Kennedy Space Center's Launch Pad 39B and put Columbia into a 325-mile-high orbit at an inclination of 28.45 degrees. The Mercury-Atlas 6 launch put the single occupant through 7.7 Gs, while the shuttle launch will make its seven occupants weigh only three times their normal weight.

Glenn's first flight completed only three orbits and lasted 4 hours, 55 minutes, 23 seconds and covered 75,679 land miles. His second flight will mark 14 orbits and last about 8 days, 20 hours, and cover some 3.6 million miles. The Mercury spacecraft made only one flight and now is in the Smithsonian's Air and Space Museum, while *Discovery* has covered a total of almost 69 million miles on 23 other missions and is slated for continued use through the first decade of the new millennium. The Mercury program clocked a total of just under 54 hours over six missions, while the shuttle fleet has logged more than 18,000 hours over 89 missions.

The 4,256-pound Mercury spacecraft could support a maximum mission duration of 1.5 days, while the shuttle, weighing in at 153,819 pounds, can stay aloft for 18 days or slightly more with an Extended Duration Orbiter pallet.

America's first orbital flight had no payload other than its occupant and some 48 items of basic experimental and observational gear. By contrast, the STS-95 mission will carry 2,600 items including a large Spacehab research module, a Hubble Orbital Systems Test Platform, an International Extreme Ultraviolet Hitchhiker and several Getaway Special Canisters. In addition, it will launch and retrieve the free-flying

Spartan-201-05 mission to study the Sun and the solar wind. Glenn could look out of one window in 1962, while in 1998 he'll be able to view the Earth and stars from 10 different windows in the shuttle.

The Atlas launch vehicle could generate a total 360,000 pounds of thrust with its one and a half-stage liquid propellant sustainer and two booster engines, while the shuttle system develops 7 million pounds of thrust when its three main engines and two solid rocket boosters are combined.

The electrical power for the Mercury capsule came from three primary batteries producing 9,000 ampere hours, while the shuttle's three fuel cells each produce 7 kilowatts of continuous power by combining liquid hydrogen and oxygen; a byproduct of this process is all drinking water needed by the crew. Mercury had four electrical buses; *Discovery* has 110. Mercury had 20 circuit breakers; *Discovery* has 961. Mercury had 100 sensors, while *Discovery* has more than 7,800.

Thermal control of the Mercury capsule's 36 cubic feet of volume was achieved through cabin gas cooling and a water boiler. The shuttle has two Freon-21 coolant loop systems, cold plate networks for its avionics units, liquid to liquid heat exchangers, deployable radiators, flash evaporators and ammonia boilers to control the temperature of its 1,300 cubic feet of crew compartment space. The shuttle's crew compartment allows 187 cubic feet for each of seven crew member and could hold 64 crew members if each was allotted just 36 cubic feet. Mercury astronauts breathed 100 percent oxygen, while shuttle astronauts breathe an Earth-like mixture of oxygen and nitrogen that can be adjusted for varying pressures.

Although both vehicles are designed for automatic control, both also are fitted for manual control. Mercury's pilot could control the spacecraft attitude in case the automatic system malfunctioned, while the shuttle uses manual control to rendezvous or fly around another spacecraft and is routinely landed manually after slowing to subsonic speeds. Mercury had 143 cockpit display components; the shuttle has 2,312. Mercury had 56 toggle switches, 8 push-button switches and 19 event indicators; *Discovery* has 856 toggle switches, 219 push-buttons and 559 event indicators.

Mercury used three solid-fuel rockets for reentry retrofire maneuvers, drag braking, and a main and drogue-stabilization parachute system for ocean splash-downs. Shuttles use a traditional aircraft tricycle landing gear configuration that features a steerable nose gear and shock strut main gears to land on a runway. Mercury had a 63-foot-diameter main parachute, while the shuttle has only a 39-foot drag chute.

Mercury used an ablative heat shield on the blunt face and heat-radiating shingles on its afterbody to protect against the heat of reentry, while the shuttle uses reinforced carbon-carbon tiles on its nose cap and leading edges, high-temperature reusable surface insulation tiles on its lower surface, low-temperature reusable surface insulation tiles on its upper wing and fuselage sides, advanced flexible reusable surface insulation on parts of its payload bay doors, fuselage and upper wing. □



1

S63-01207



2

S62-00330

1) View of Astronaut John Glenn insertion into the Mercury Spacecraft. 2) View of Astronaut John Glenn, Dr. William Douglas, astronauts flight surgeon, and Equipment Specialist Joe Schmitt leaving crew quarters prior to Mercury-Atlas 6 mission. Glenn is in his pressure suit and is carrying the portable ventilation unit. 3) The Mercury-Atlas 6 "Friendship 7" spacecraft is retrieved from the Atlantic Ocean following John Glenn's three-orbit space mission. In this view, the capsule is still in the water, with the retrieval cable connected to it. 4) Launch of the Mercury-Atlas 6 mission on Feb. 20, 1962.



3

S62-00941



4

S62-00363

# 20 Years Ago at JSC

## Enterprise makes stopover at JSC

### Thousands attend awards ceremony and Open House

Reprinted from the March 17, 1978, issue of Space News Roundup.

Nearly a quarter of a million area residents turned out over the weekend to view the *Enterprise*, according to Air Police at the Ellington Air Force Base.

When *Enterprise*, America's newest spacecraft put into the Marshall Space Flight Center on March 13, it officially brought to an end the very successful approach and landing test project.

Donald K. Slayton, who headed up the more than 600-member NASA/industry and Department of Defense team which worked on ALT said, "completion of ALT now allows us to begin orbital flight testing with a high level of confidence, both in the spacecraft and the personnel who will conduct the orbital flight test program." It was a NASA-wide effort, a program which utilized a wide variety of talents from JSC, the Kennedy Space Center, and Dryden Flight Research Center as well as industry and DOD, Slayton said.

At an award ceremony at Houston, Slayton, who is now manager of OFT for the Space Shuttle Program Office at JSC, told his team leaders, "I wish to thank each member of the ALT team for their exceptional performance." For his leadership in ALT, Slayton was presented the NASA Outstanding Leadership Medal while 15 other key NASA personnel, including astronaut crew and 747 members, were presented NASA Exceptional Service Medals for their role in ALT: nine JSC employees, five employees from DFRC, and one from KSC.

Christopher C. Kraft, JSC Director, presented the awards before an enthusiastic crowd of 25,600 people

plane-side after the 747/*Enterprise* landed at the Ellington Air Force Base, north side of JSC, on a refueling stop enroute to MSFC.

The award to Slayton credited him for organizing and molding "a diverse group of NASA, DOD and contractor personnel into a dynamic test team that successfully planned and carried out the ALT program." His outstanding leadership was a major factor in the success of the ALT flights," the award read.

Astronauts Haise (who could not attend the ceremony), Fullerton, Engle and Truly received their awards for their role as members of the ALT Orbiter Crew.

Other recipients at JSC were Thomas U. McElmurry, who was commended for the operational planning, organization, and day-to-day management of ALT; Carl B. Peterson, whose award was for his management of the 747 carrier aircraft modification program; John W. Kiker, who conceived the idea of utilizing the 747 as the carrier of the orbiter; Louis E. Guidry, aircraft engineer, who was a key member of the 747 carrier aircraft during the entire ALT program; and Donald R. Puddy, Flight Director, who demonstrated exceptional ability in preparing and directing the ALT flight control team at JSC.

Those at DFRC who received the exceptional service medal included 747 crew members Fitzhugh L. Fulton, Jr.; Thomas C. McMurty; Flight Engineer Victor W. Horton; and William H. Andrews, the Shuttle Carrier Aircraft Test Team Manager. John G. McTigue of DFRC was awarded the Exceptional Service Medal for his outstanding leadership to the entire ground operations engineering test team which included NASA representatives from KSC,



**A RECORD CROWD**—This photograph shows just a fraction of those who were on hand to view the Ellington Landing. JSC PHOTO

JSC, DFRC and industry.

The Highway Patrol officially estimated another 5000 cars parked on Texas Highway 3 waiting for the 747/*Enterprise* arrival, and people from all over the JSC site watched as the 747 made its sweep over Bldg. 2 and around the Center.

There was a total of 13 flights in ALT, beginning with the taxi-tests of the mated 747/orbiter combination in February and concluding with the fifth and final "free flight" on October 2, 1977. After the initial taxi-tests, there were five unmanned "inert" captive flights during which the 747 carried the Orbiter *Enterprise* with its systems inactive to assess the vehicle's combined structural integrity as well as determine its aerodynamic performance at various speeds and altitudes.

The five captive unmanned flights were followed by three manned captive flights during which time astronaut crews performed numerous system and performance tests while

the Orbiter remained attached to the top of the 747 carrier aircraft.

The first free flight with astronauts Haise and Fullerton at the controls of the 75-ton Orbiter *Enterprise* was successfully flown on August 12, 1977. The Orbiter was released from the 747 at an altitude of 24,100 and Haise and Fullerton piloted the spacecraft to a successful landing at Edwards Air Force Base dry lake runway five minutes and 21 seconds later.

A second flight, with astronauts Engle and Truly at the controls of *Enterprise* took place on September 13. This was a five and a half minute flight after which spacecraft commander Engle said the Orbiter performed superbly. Pilot Truly said *Enterprise* was an excellent handling machine.

Three more flights of the Orbiter from its carrier aircraft followed and the flight test program ended with the fifth and final flight on October 12. With Haise and Fullerton at the con-

trols, the Orbiter made a landing on the hard surface runway of Edwards.

A series of "ferry flights" followed. These tests, which were completed in mid-November, assessed the aerodynamic characteristics of the combined 747/Orbiter vehicle in the "ferry mode". The ferry mode will be used during operational Shuttle flights where the Orbiter is transported cross-country from its manufacturing site to launch sites and subsequent landing sites back to launch sites, either at Kennedy Space Center, Florida, or the U.S. Air Force launch site at Vandenberg, California.

The ALT program officially ended with the delivery of *Enterprise* to MSFC where it will now undergo a series of ground vibration tests preparatory to the initial OFT now scheduled for the spring of 1979. The first orbital vehicle will be Orbiter 102, now being assembled at the Rockwell International facility at Palmdale, California.

## 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.

**Weight safety:** Required course for employees wishing to use the Gilruth weight room. The next classes are scheduled for at 8 p.m. March 26 and April 9 (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 p.m.- 6:15 p.m. Mondays & Wednesdays. Cost \$24.00 for 8 weeks.

**Stamp Club:** Meets every 2nd and 4th Monday at 7:00 p.m. in room 216.

**Akido:** Introduction to Aikido beginning classes start every month. Class meets Tuesday and Wednesday from 5:15 p.m. to 6:15 p.m. Instruction by 4th Degree Black Belt. Learn to defend yourself & get a great aerobic workout. Cost is \$35.00 per month.

**Step/bench aerobics:** Low impact cardiovascular workout, classes every Monday, Tuesday & Thursday from 5:15 p.m. to 6:15 p.m. Cost is \$32.00 for 8 weeks- Kristen Taragzewski instructor. x36891

**Ballroom Dance Lessons:** Classes meet every Thursday from 7:00 p.m. to 8:15 p.m. for Beginner Advanced Classes and classes for Beginner-Intermediate & Intermediate are from 8:15 p.m. to 9:30 p.m. Cost is \$60.00 per couple.

**Fitness Program:** Health Related Fitness Program includes medical examination screening, 12 week individually prescribed exercise program. Call Larry Wier at x30301 for more information.

**C & W Dance Lessons:** Beginner class 7:00 p.m. to 8:30 p.m. Mondays. Advanced class (must know basic steps to all dances) 8:30 p.m.-10:00 p.m. Cost is \$20.00 per couple.

**Defensive Driving Course:** Class is offered once a month at the Gilruth Center. Interested parties must pre-register. Cost \$25.00.

**Nutrition Intervention Program:** Would you like to learn more about the role diet & nutrition play in your health? Open to all NASA Civil servants, contractors and spouses, this 6 week program includes private consultation with the Dietitian, a lecture series and blood analysis to chart your progress. Contact: Ms Tammie Shaw 32980

**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, \$4.75; Sony Loew's Theater, \$5.

**Stamps:** Book of 20, \$6.40

**Disney on Ice:** "Hercules" 11:30 a.m. March 28 at the Compaq Center. Tickets are \$13.

**JSC Picnic:** 11 a.m. - 7:30 p.m. April 5 at Astroworld. Tickets are \$23.65.

**Metro passes:** Tokens and value cards available.

**Coming Soon:** Astroworld season passes, Sea World, Splashtown Water Park.

## 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 Editor Kelly Humphries in Bldg. 2, Rm. 180, or via e-mail to [kelly.o.humphries1@jsc.nasa.gov](mailto:kelly.o.humphries1@jsc.nasa.gov).

Retirees should submit change of address notices to the distribution group at Mail Code BT552 or call Ignacia Ramirez at 281-483-6161.

# JSC workers earn Stellar Awards at Rotary International gala banquet

(Continued from Page 1)

shuttle, setting the stage for today's partnership with Russia on the International Space Station Program.

A significant part of this vision was realized during the past year, as Sojourner, the robotic Mars rover, began exploration of the red planet. Later this year, another key milestone will be achieved when, together with its international partners, NASA will begin assembly of the single largest international aerospace project in history—the International Space Station.

"During his presidency, President Bush exhibited outstanding leadership in providing our nation with the vision and means to accomplish our goals in space for the 21st Century," said NASA Administrator Daniel S. Goldin. "His administration not only launched a new era in human and robotic exploration of our solar system, it also forged a new partnership with Russia."

JSC's Frank Culbertson, manager

of the Phase 1 Program of docking missions and continued American presence aboard the Russian Mir Space Station, was honored for his work in planning and executing U.S. scientific investigations aboard Mir, for his responses to potentially serious threats to crew safety and for strengthening NASA's relationships with the Russian space program.

JSC Flight Director Jeff Bantle received a Stellar Award for effecting improvements in shuttle ascent and entry operational procedures and safety, and for significant cost savings in shuttle support network operational costs.

Former flight director John Muratore, now project manager for the X-38 human spacecraft, earned a Stellar Award for improving technical and management processes for designing and building human spacecraft which will lead to significantly lower costs and better design than traditional approaches.

JSC's Rodolfo Gonzalez, a former

Engineering Directorate cooperative education student, received a Stellar Award for designing, developing, testing and evaluating the autonomous extravehicular robotic camera Sprint Project flight control system.

And Karen Pickering of JSC received a Stellar Award for technical leadership in the Phase III Lunar-Mars Support Test Program regenerative life support systems tests.

Also receiving Stellar Awards were Jim Hunter of the U.S. Air Force, for developing the first detailed space-campaign analysis model to determine the value of space systems to ground and air forces; David Korth of Barrios Technology, for demonstrating and validating the effectiveness and suitability of international space operations planning tools and processes, including the concept of joint Russian/U.S. planning operations; Chris Scott of Lockheed Martin, for successfully managing Mission Control Center support of space shuttle flight operations and delivery

of International Space Station capabilities into the MCC; Dr. Matt Barry of United Space Alliance, for leadership and infusing new concepts and technologies into flight operations and for demonstrating automated expert systems concepts and technology to improve safety and reduce costs; and Kerry Switzer of the Boeing Company, for her leadership in the design, manufacture and testing of the International Space Station Pressurized Mating Adapter.

Also receiving Stellar Awards were Jim Hazelton, chief shuttle flow manager for United Space Alliance, for excellence in planning and scheduling all of Kennedy Space Center's shuttle flight hardware operations; Gerald Hoskins of the Naval Research Laboratory; for his work as project engineer and manager of many of the Navy's satellite programs and the Trident II submarine navigation system; and Alex McCool of Marshall Space Flight Center, for his development of

propulsion systems for early U.S. space launch vehicles and for managing performance of the shuttle main propulsion system.

Three teams received Stellar Awards: the NASA Jet Propulsion Laboratory Mars Pathfinder team, the 90-day closed chamber Lunar-Mars Life Support Test Crew team of engineers from JSC, Lockheed Martin Co. and Allied Signal Aerospace Co.; and the Boeing Company's Parents, Kids, Computers and Science Program team for providing instruction in basic computer and science concepts to "at-risk" junior high students.

Receiving this year's Space Communicator Award was CBS News consultant and space writer William Harwood for his unique contributions to the success of the space program by his exceptional news coverage of the technical complexity, the magnitude and the implications of the year's major events in space for television, national newspapers and industry trade publications.

## People on the Move

Human Resources reports the following personnel changes as of Feb. 28:

### New Management Assignments

Bob Panneton was selected as deputy chief, Avionics Test and Analysis Branch, Avionic Systems Division, Engineering Directorate

Dan Harrison was selected as chief, Electronic Design and Development Branch, Avionic Systems Division, Engineering Directorate.

### Additions to the Workforce

Kelly Beck, Glenn Pogue, and Joe Williams join the Flight Design and Dynamics Division in the Mission Operations Directorate as flight controllers.

James Azbell, Jimmy Spivey, and David Gruber join the Systems Division in the Mission Operations Directorate as flight controllers.

Vern Hall joins the Space Operations Management Office as assistant manager, Mission and Data Services.

### Promotions

Laura Goerner was selected as directorate secretary in the Engineering Directorate.

Carol Sasser was selected as directorate secretary in the Center Operations Directorate.

Diana Norman was selected as directorate secretary in the Space and Life Sciences Directorate.

Betty Shives was selected as secretary, ISO 9000 Project Office

### Reassignments Between Directorates

Susan H. Anderson moves from the Phase I Program Office to the Mission Operations Directorate.

David Hanson moves from the Phase I Program Office to the Mission Operations Directorate.

### Reassignments to Other Centers

John Sharkey of the International Space Station Program Office moves to Dryden Flight Research Facility.



GOOD VIEW—JSC employees view the recent partial solar eclipse from in front of Bldg. 2 using a telescope provided by Gary Nealis, bottom left, and welder's glass. From left are Mike McFarlane, Nealis, Steve Saubert, Brad Sayles (peering through the telescope) and Patrick Quinn.

## X-38 offers chance to work on flight hardware

The X-38 Project Team is seeking volunteers for eight-month assignments to install thermal protection system tiles, blankets, and insulation on the X-38 space flight test vehicle.

Any JSC civil servant seeking a temporary change in assignment is eligible—no engineering or technical training are required. Preference will be given to employees who desire to do something different, enjoy working in a team, enjoy working with their hands, and want to perform "hands-on" work with glues and epoxies.

The eight-month rotation is divided

into two parts. The first two months will be devoted to extensive training in thermal protection system installation procedures provided by personnel from the Structures and Mechanics and the Manufacturing, Materials, and Process Technology Divisions. Upon completion of the training, selectees will spend the next six months following the procedures they learned along with the appropriate JSC safety requirements.

Selectees will provide general technical support to install tile surface densification, Strain Isolator Pad bond-

ing, gap filler bonding, thermal barrier installation, and tile/blanket bonding to the X-38 space flight test vehicle.

Four volunteers will be selected for April 1998 through December 1998 rotations. Another four will be selected for October 1998 through June 1999 rotations. Upon completion of the rotation, selectees would return to their home organizations.

Interested employees should contact Brady Pyle, x32012, by March 20. For information about duties and responsibilities, contact Herb Mitchell, x32257.

## Dates & Data

### March 13

**Space society meets:** The Clear Lake chapter of the National Space Society will meet at 6:30 p.m. March 13 at the Radisson Hotel, 9100 Gulf Fwy. in the Deer Park room. For details, call Murray Clark at 367-2227.

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

### March 17

**Solar energy video:** Local members of the Texas Solar Energy Society will show a new video narrated by Dan Rather entitled "The Infinite Power of Texas" at 11:30 March 17 in Bldg. 7, Rm. 141. For details call Mike Ewert at x39134.

### March 18

**Moon-Mars briefing:** Two exploration project leaders will discuss the latest information on Lunar Prospector and Mars Pathfinder at 10 a.m. March 18 in Teague Auditorium.

Alan Binder, Lunar Prospector principal investigator, and Matthew Golombek, Mars Pathfinder project scientist will speak, and Doug Cooke, JSC Exploration Office manager, will moderate.

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. March 18 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. March 18. For information and location, 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. March 18 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 March 18 in Bldg. 31, Rm. 129. An open discussion meeting is

planned. For more information, call Al Jackson at x35037.

**Scuba club meets:** The Lunarflins will meet at 7:30 p.m. March 18. For information and location, call Mike Manering at x32618.

### March 19

**Child care board:** The Space Family Education board of directors for the JSC Child Care Center will meet at 11:30 a.m. March 19 in Bldg. 45, Rm. 712D. For more information on this open meeting, call Gretchen Thomas at x37664.

**NCMA meets:** The Space City-Houston Chapter of the National Contract Management Association is sponsoring a national education seminar on electronic contracting on March 19 at the University of Houston-Clear Lake campus. Registration begins at 7:45 a.m. and the seminars begin at 8:30 a.m. This seminar will explore the latest innovations in acquisition and contracting for beginners as well as experts. Cost is \$215. For details and registration

call Laura Bankey at 228-7658.

### March 24

**Grand rounds:** The March Space Medicine Grand Rounds will be held at 8:30 a.m. March 24, at the Open Gates Telecommunications Center, UTMB 2419 Sealy, Galveston. The speaker will be Dr. Jeffrey R. Davis, director, Aerospace Medicine Residency Program, UTMB at Galveston. The topic will be "Medical Issues for a Mars Mission." Van transportation available from JSC. For reservations, call x30452

### March 25

**Spaceland Toastmasters meet:** The Spaceland Toastmasters will meet at 7 a.m. March 25 at the House of Prayer Lutheran Church. For more information, call George Salazar at x30162.

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### March 26

**Radio Club meets:** The JSC Amateur Radio Club will meet at 6:30 p.m. March 26 at the Piccadilly, 2465 Bay Area Blvd. For more information, call Larry Dietrich at x39198.

### April 3

**Star Party:** Moody Gardens and the JSC Astronomical Society are sponsoring a star party at 7 p.m. April 3 at the Moody Gardens Discovery Pyramid. Numerous telescopes will be set up for viewing. The star party is open free of charge to the public. Rain date is April 4.

## NASA Briefs

### Children use Internet to learn plane design

A NASA project called Aero Design Team Online is using the Internet to help students learn about airplane design. Students and the general public can visit a website (<http://quest.arc.nasa.gov/aero/>) to find out how aeronautical engineers use airplane models, wind tunnels, supercomputers, simulators and other tools during the airplane design cycle. The project continues through May, although plans are under way to extend it into the summer. "We're teaching about airplane design through the lives of people who are doing the work," said Susan Lee of NASA's Ames Research Center. In addition, kids ask questions via e-mail; learn how an airplane flies; see pictures of aircraft; and participate in Internet chats with people from teams that design and test airplanes.

### El Niño image shows warm water thinning

The most recent image from the TOPEX/Poseidon satellite shows the large, warm water pool, commonly referred to as El Niño, has thinned in volume along the central tropical Pacific, indicating that sea level is slowly beginning to return to a more normal state along the equator. The image shows sea surface height relative to normal ocean conditions and sea surface height is an indicator of the heat content of the ocean. The area and volume of the El Niño warm water pool that is affecting global weather patterns remains extremely large, but the pool has thinned along the equator and near the coast of South America. This "thinning" means that the warm water is not as deep as it was a few months ago. Oceanographers indicate they would expect to see this during the ocean's gradual transition back to normal sea level.

### Astronomers stalk asteroids with Hubble

Astronomers have stumbled on an unusual asteroid hunting ground: the thousands of images stored in the Hubble Space Telescope archive. The hunt, by Robin Evans and Karl Stapelfeldt of NASA's Jet Propulsion Laboratory, Pasadena, Calif., has yielded a sizable catch of small asteroids—about 100. Their preliminary analysis suggests that a total population of 300,000 small asteroids—essentially rocks just over half a mile to two miles wide (1-3 kilometers)—are orbiting between Mars and Jupiter in a band of space debris known as the main belt. Currently, there are 8,319 confirmed main-belt asteroids whose orbits have been measured, and about the same number have been sighted but not confirmed.

# Space research creates medical breakthroughs

In the month of February, when people's attention turned to matters of the heart, and in recognition of American Heart Month, NASA highlighted how its research and technology has led to breakthroughs in the understanding, diagnosis and treatment of heart disease—the number one killer of American men and women.

America's space program has helped revolutionize the practice of medicine through research on the cardiovascular system that is leading

to many break-through discoveries, testing procedures and treatments, many are less painful, less costly and less traumatic to patients.

"I am proud that NASA research is helping doctors treat heart disease," said NASA Administrator Daniel S. Goldin. "This is a fascinating time for medical science, when the developments of our aeronautics and space programs can be applied to a disease that affects so many here on Earth."

A few of today's space-derived improvements include blood pres-

sure monitors, self-adjusting pacemakers, EKGs, exercise equipment and ultrasound images. The technology of tomorrow will include microwave surgery, tissue replacement, heart pumps, low radiation imaging, and fetal imaging.

"Who would have dreamed that lasers used to measure Earth's ozone layer could be used to unclog arteries," Goldin continued. "If the past is our guide, our future in space will continue to advance medical science."

NASA is working with the National

Institutes of Health, the U.S. Department of Health and Human Services, dozens of hospitals, researchers and private companies. These collaborations have resulted in successful new programs to diagnose and treat heart disease.

Astronauts who spend extended periods in space often experience temporary weakening of their hearts and blood vessels. As doctors and researchers work to understand why this happens, their findings can be applied to heart disease on Earth.



JSC Photo S98-02887 by Steve Candler

**DIGGING IN—JSC Director George Abbey joins Clear Creek Independent School District trustees in breaking ground for a new intermediate school on the grounds of JSC. From left are Dr. John Wilson, superintendent of Clear Creek ISD; Abbey; Sophia LeCour, board of trustees president; and trustees Ralph Parr and Richard Labrecque. Not pictured are trustees James Main and Cheryl Johnson. Site work has begun on the \$13-million bond-financed school, which is to be finished by the fall of 1999.**

## NASA-JSC Family Picnic tickets on sale

Tickets are now on sale for the NASA-JSC Family Picnic, set for April 5 at Astroworld, for all NASA badged employees, retirees, and contractors.

The picnic, from 11 a.m.-7:30 p.m. Sunday, will feature a tug of war, horseshoes, face painters, music provided by a DJ, and sand volleyball. Looney Tunes characters and other surprise entertainment also will be on hand. Entertainment will be provided by the Houston Livestock Show and Rodeo speakers committee.

Cost is \$15 per person, ages 3 and up, for the first 2,700 tickets sold. Cost per person after 2,700 tickets are sold is \$23.65. The cost for Astroworld season pass holders for the first 150 tickets sold is \$8, or \$10 after 150 tickets are sold.

Ticket prices include all rides, shows and attractions plus a barbecue dinner, beverages and ice cream. Meal tickets must be redeemed during the 12:30 -3:30 p.m. serving time to receive the free return ticket.

Ticket sales are limited to six per badged employee. Tickets are available through April 2 at both Bldg. 11 and Bldg. 3 Exchange Stores.

## Women's Outreach develops web site

NASA's Women's Outreach Initiative has created a web site to highlight the ways in which NASA's programs benefit Earthbound families.

The "There's Space in My Life..." initiative presents information in a non-technical, straight-forward way, centered around topics of particular interest to women and their families: health, family, safety, home and garden, travel and leisure time, and the mysteries of Earth and the universe.

NASA's research and technology is not just about distant galaxies, astronauts and supersonic aircraft. The science and engineering that make NASA's programs possible touch lives every day. This influence is most apparent in the field of medicine where innovative thinking has made it possible to adapt deep space technology to understanding, detecting and treating cancer. NASA's research is designed to learn how to live and work in space. Its application, however, often hits much closer to home.

Of special interest is a chronological list of highlights of the contributions women have made to America's space and aeronautics program. The web site also contains information on NASA research and technology that is used to detect and treat heart disease. NASA technology also is used in many types of medical research affecting women.

For more information see the Women's Outreach Initiative web site at:

<http://www.nasa.gov/family/index.html>

## Black engineers plan banquet to honor scholarship recipients

The National Society of Black Engineers-Houston Alumni Extension will host its first annual scholarship luncheon at 11:30 a.m. April 25 at Brady's Landing.

For information or tickets contact Sabra Crawford at 333-7028.

## Lunar Prospector finds ice evidence

(Continued from Page 2)

extends to a depth of about 6.5 feet, he found. On that basis, Lunar Prospector's estimate of water ice would have to be increased by a factor of up to four, to the range of 44 million to 1.3 billion tons. In actuality, Binder and Feldman caution that, due to the inadequacy of existing lunar models, their current estimates "could be off by a factor of ten in either direction."

There are various ways to estimate the economic potential of the detected lunar water ice as a supporting resource for future human exploration of the Moon. One way is to estimate the cost of transporting that same volume of water ice from Earth to orbit. Currently, it costs about \$10,000 to put one pound of material into orbit. NASA is conducting technology research with the goal of reducing that figure by a factor of 10, to only \$1,000 per pound. Using an estimate of 33 million tons from the lower range detected by Lunar Prospector, it would cost \$60 trillion to transport this volume of water to space at that rate, with unknown additional cost of transport to the Moon's surface.

From another perspective, a typical person consumes an estimated 100 gallons of water per day for drinking, food preparation, bathing and washing. At that rate, the same estimate of 33 million tons of water, which translates to 7.2 billion gallons, could support a community of 1,000 two-person households for well over a century on the lunar surface, without recycling.

"This finding by Lunar Prospector is primarily of scientific interest at this time, with implications for the rate and importance of cometary

impacts in the history and evolution of the Solar System," said Dr. Wesley Huntress, NASA associate administrator for space science. "A cost-effective method to mine the water crystals from within this large volume of soil would have to be developed if it were to become a real resource for drinking water or as the basic components of rocket fuel to support any future human explorers."

Before the Lunar Prospector mission, historical tracking data from various NASA Lunar Orbiter and Apollo missions had provided evidence that the lunar gravity field is not uniform. Mass concentrations caused by lava which filled the Moon's huge craters are known to be the cause of the anomalies. However, precise maps of lunar mass concentrations covering the moon's equatorial near-side region were the only ones available.

Lunar Prospector has dramatically improved this situation, according to co-investigator Dr. Alex Konopliv of NASA's Jet Propulsion Laboratory. Telemetry data from Lunar Prospector has been analyzed to produce a full gravity map of both the near and far side of the moon. Konopliv also has identified two new mass concentrations on the Moon's near-side that will be used to enhance geophysical modeling of the lunar interior. This work has produced the first-ever complete engineering-quality gravity map of the Moon, a key to the operational safety and fuel-efficiency of future lunar missions.

"The findings announced today are just the tip of the iceberg compared to the wealth of information forthcoming in the months and years ahead," said NASA's Lunar Prospector mission manager Scott Hubbard of Ames.



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The Roundup office is in Bldg. 2, Rm. 181. The mail code is AP3. The main Roundup telephone number is x38648, and the fax number is x45165. Electronic mail messages may be directed to [kelly.o.humphries1@jsc.nasa.gov](mailto:kelly.o.humphries1@jsc.nasa.gov) or [leslie.eaton1@jsc.nasa.gov](mailto:leslie.eaton1@jsc.nasa.gov).

Editor . . . . . Kelly Humphries  
Associate Editor . . . . . Leslie Eaton

## ISO 9001 audit success builds on pathfinder efforts

(Continued from Page 1)

mally documenting key processes that had been previously undocumented. In other cases, it meant dramatically improving how the center operates, such as in the areas of electronic document repositories, calibrated tool recall processes, inter-organizational agreements, metrics evaluation and preventive action.

All NASA centers are under a requirement from NASA Administrator Daniel S. Goldin to be ISO 9001 registered by September 1999.

Removal of registration status is a tangible threat, Norbraten said, and NQA will audit to ensure the center does not backslide, and that it is

using its management structure to continue to improve processes.

Norbraten said that two pathfinder activities greatly helped lead the way to ISO 9001 success, the Engineering and Safety, Reliability and Quality Assurance Directorates' pilot project in 1995 and 1996, and White Sands registration in 1996. In addition, many of JSC's contractor associates already had undertaken ISO 9000 prior to JSC's commitment. Many others have joined the movement in response to requirements established by NASA contract managers, while still more are doing it to better position themselves for future business with NASA or other customers.

### First female shuttle commander

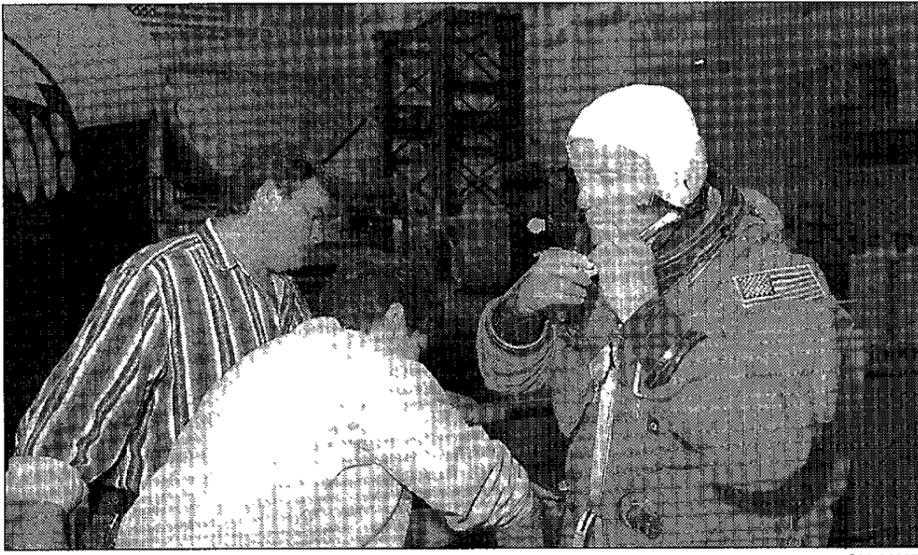
## Collins will lead mission to deploy X-ray telescope

(Continued from Page 1)

Ashby. Hawley will be making his fifth space flight during STS-93, having flown previously on STS-41D in 1984, STS-61C in 1986, STS-31 in 1990 and STS-82 in 1997. Coleman has one previous space flight to her credit, having flown on STS-73, the second United States Microgravity Laboratory mission in October/November 1995. Tognini, who spent 14 days on the Mir space station in 1992, will be making his first shuttle flight.

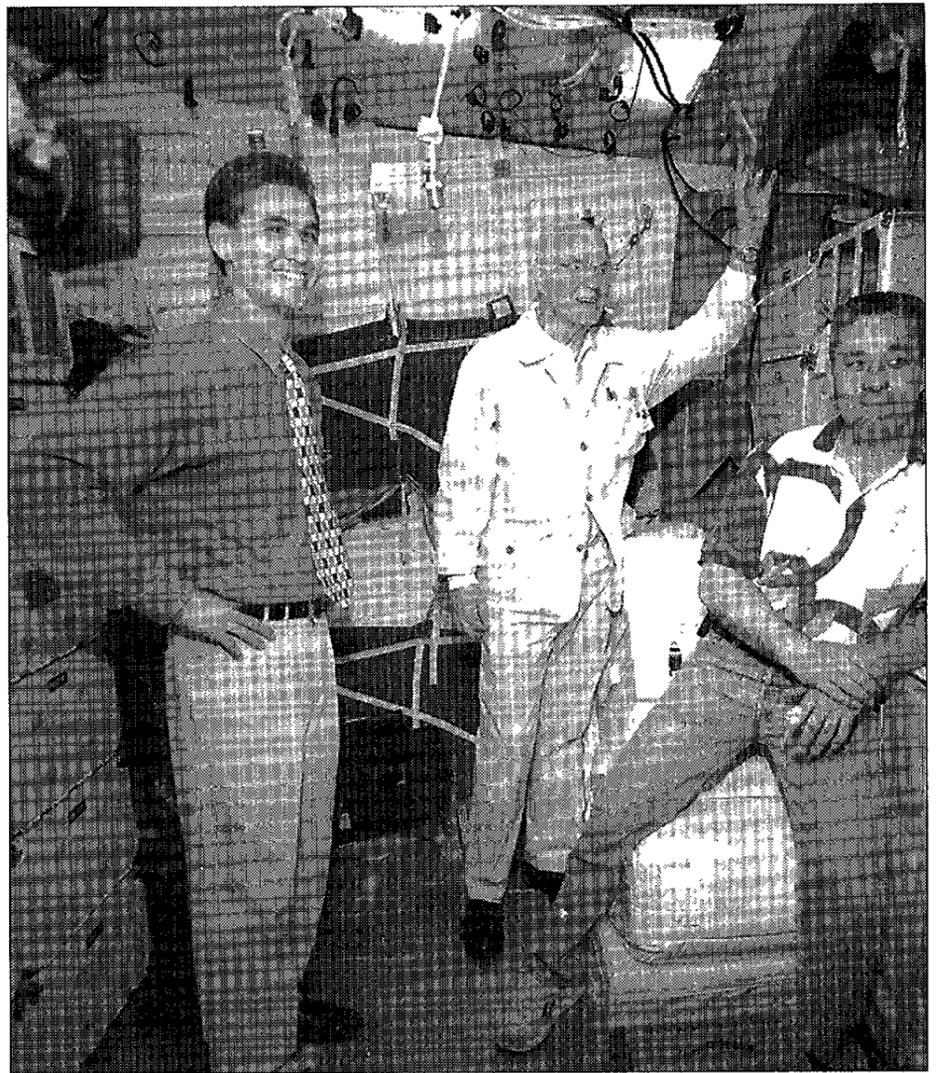
During the five-day mission, the crew will deploy the Advanced X-ray Astrophysics Facility Imaging Sys-

tem, which will conduct comprehensive studies of the universe. AXAF will be the most advanced X-ray telescope ever flown. When scientists begin using AXAF next year, they will finally be able to unlock the secrets of some of the most distant, powerful and violent objects known to exist in the universe. They will study such exotic phenomena as exploding stars called supernovae, strange powerful objects called quasars, and mysterious black holes which are so massive that everything near them is pulled inside causing an explosion of X-rays that AXAF can study.



S98-02327

Suit Technicians Mike Birkenseher and Jean Alexander suit up Sen. John Glenn prior to entry into the crew compartment trainer for egress training.



S98-02331

Adam Flagan, crew trainer, Sen. John Glenn and Jason Fennelly, photographer, enjoy a relaxing moment during a break in training in the crew compartment trainer.



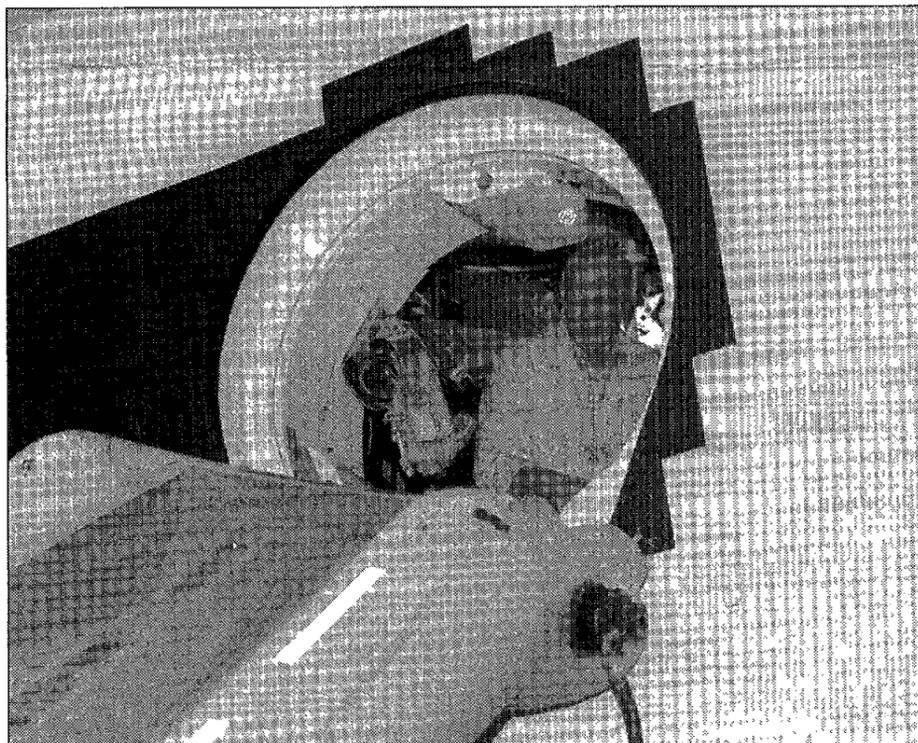
S98-02328

Suit Technician Jean Alexander checks Sen. John Glenn's suit after egress from the crew compartment trainer as Carlous Gillis looks on.



S98-02330

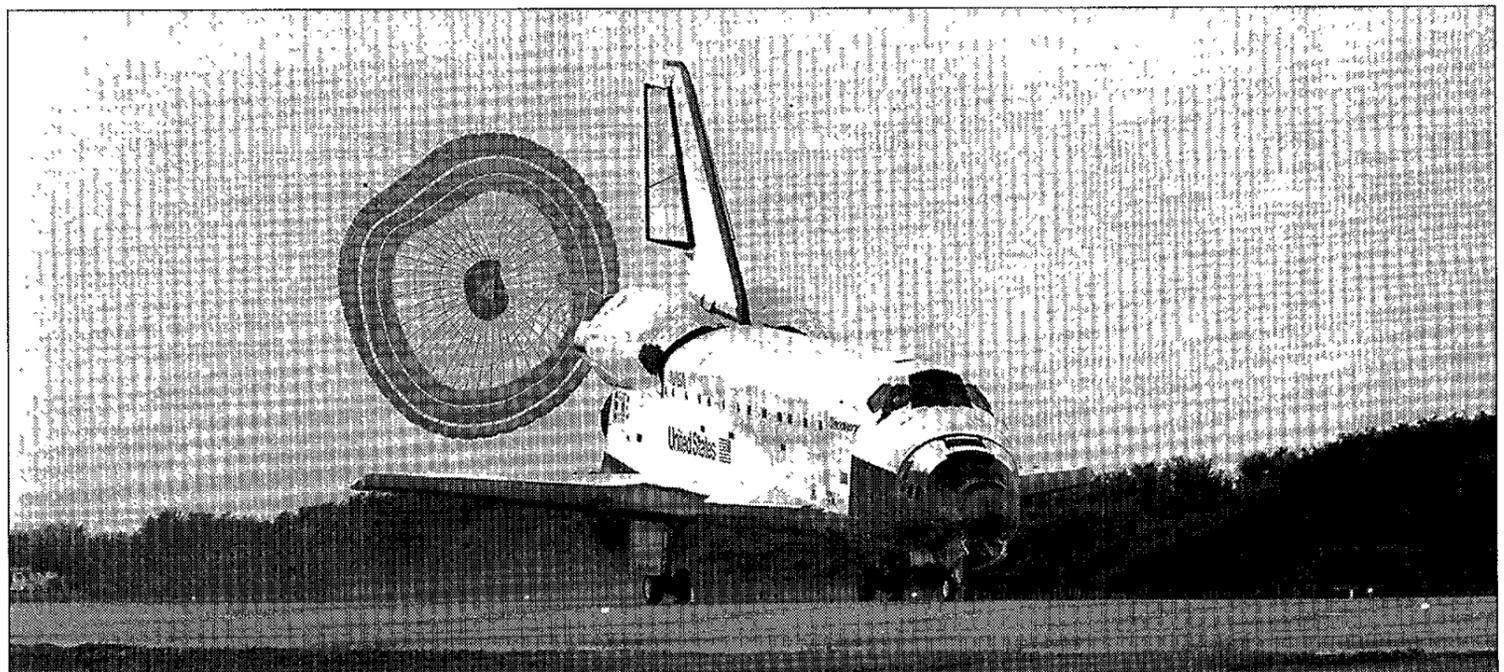
Sen. John Glenn receives crew escape pole training from Sharon Jones using the functional pole trainer.



S98-02328

Sen. John Glenn studies the crew escape slide in the crew compartment trainer during emergency egress training.

Drag chute release on *Discovery* at Kennedy Space Center's Shuttle Landing Facility.



KSC-97PC-1250